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ABSTRACT

This document contains the following papers on issues related to telecommunications and online learning in graduate and inservice teacher education: (1) "Using Qualitative Research Methods To Study Preservice Teachers' Use of a Computer Conference" (Douglass J. Scott); (2) "Interaction and Collaboration among Teachers: On the Use of a Knowledge Based Network" (Ester Alake-Tuenter and Kees Jongmans); (3) "Assessing the Impact of a Large-Scale Online Teacher Professional Development Community" (Judi Fusco, Hunter Gehlbach, and Mark Schlager); (4) "Web-Based Learning: Moving Beyond the Internet as a Research Tool" (Debra Sprague and P. Shane Gallagher); (5) "A Framework for the Design of Web Based Courses" (Robert V. Price and Nancy Maushak); (6) "Transforming the Graduate Learner from Traditional to Web-Based Instruction: Integrating Internet Technologies To Enable the Paradigm Shift" (Carl Reynolds and Bruce Morgan); (7) "An Examination of the Net Generation: Using Doctoral Students in Web Based Courses" (Larry Holt); (8) "The Internet Learning Forum: Designing and Building an Online Community of Practice" (Julie A. Moore, Diana Treahy, Chin-Chi Chao, and Sasha A. Barab); (9) "Teachers Sharing and Learning Online--An Innovative Professional Development Model" (Melanie Zibit Goldman); (10) "Incorporating Standards in Web-Based Classroom Instruction" (Frances K. Bailie and Catherine M. Ricardo); (11) "Using WebQuests to Construct Learning" (Blanche O'Bannon); (12) "The Web Institute for Teachers: Engaging Teachers in Developing Web-Based Curriculum" (Craig A. Cunningham, Frada Boxer, and Ellen Dairyko); (13) "A Virtual Learning Environment for the Improvement of Cognitive Processes" (Maria del Carmen Malbran and Claudia Mariela Villar); (14) "Comprehensive Examinations via E-Mail" (David P. Zimmerman); (15) "The Technical Helpdesk for CalStateTEACH: The 'ER' for a Distributed Learning Teacher Credential Program" (Norm Nicolson, Teresa Macklin, and Curt Cochran); and (16) "Talent Detection and Development Using the Internet" (Rosa Miriam Ponce Meza and M. Farias-Elinos). Individual papers contain references. (MES)

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TELECOMM: GRADUATE & INSERVICE

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The Internet has become a major force in education, and teacher education institutions are addressing this issue in a many different ways. The papers in this section demonstrate a variety of approaches, through reports of current practice as well as information about research projects in planning or implementation stages. Basic themes include developing knowledge and skills in the use of Internet tools, learning to integrate Internet activities into curriculum, designing interactive Internet-based environments, collaboration, and providing ways to help teachers overcome feelings of isolation. Specific methods include online components within face-to-face classes, online for-credit university courses, online professional development activities, and institutes that are extended through the use of online activities, to name a few. Support, both technical and academic, is essential, and is mentioned throughout.

Research into various online tools is providing educators with information to assist them in the selection and utilization of these in their own environments. Douglass Scott examined the use of a computer conference by graduate teacher certification students who also regularly interacted with each other on a face-to-face basis. Interviews with participants revealed that students felt more ownership of the computer conference than they did of class discussions. Perceived strengths and weaknesses are reported, and comments about how the results were used to improve both the online and face-to-face interactions are also included.

Student interaction and collaboration are key elements in many learning environments. Ester Alake-Tuenter and Kees Jongmans describe their in-progress research study that examines collaboration and the use of a communal database (Web Knowledge Forum). They explain the theoretical background (constructivism, situated learning, and computer supported collaborative learning) and research methodology employed.

Judi Fusco, Hunter Gehlbach, and Mark Schlager describe the use of TAPPED IN™, an online professional development community used by 15 organizations and over 6,000 members. Hypothesizing that TAPPED IN would help teachers overcome feelings of isolation and would increase effectiveness of professional development, they report on a survey that was administered to examine the effectiveness of this tool. Based on survey findings, five barriers to the use of TAPPED IN are discussed, with suggestions about how these might be overcome.

TAPPED IN™ is one of the online tools used in a course described by Debra Sprague and P. Shane Gallagher, who present a detailed description of the development and implementation of an online course for teachers enrolled in the Integrating Technology in Schools Program. Both asynchronous and synchronous activities were included, but the authors feel that some face-to-face experiences would be helpful. A discussion of problems encountered is presented to help others in planning online courses.

Course design is addressed by Robert V. Price and Nancy Maushak , who describe the PSI (personalized system of instruction) model, and provide an example of how it has been used to design a web course, *On-Line Communications and the Internet*. The authors conclude with a discussion of ways this approach overcomes some of the problems associated with traditional individual study courses.

Online courses may require new approaches for students, as well as for instructors. Carl Reynolds and Bruce Morgan describe their online course from the perspective of facilitating learning as students (and instructors) adjust to the online environment. They explain seven strategies that they used, as well as what technologies were used in the class (and why they were chosen).

Larry Holt explores the balance needed between effective teaching and learning practices as he describes how doctoral students were involved in the shift to web-enhanced and online courses. A theoretical basis for such teaching is presented along with a description of how the web is used in a Models of Teaching class. Learning is enhanced by the participatory class environment.

Online professional development activities are increasing. Julie A. Moore, Diana Treahy, Chin-chi Chao, and Sasha A. Barab describe 4 current models for teacher professional development on the Internet, and then explain their NSF-funded project to design and implement a more effective community model. Basic design principles include virtual classroom visits, each of which includes a class video along with teacher commentary. A detailed

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description of the virtual classroom screen presence is included.

Melanie Zibit Goldman describes *MSTelementoring*, a professional development model in which a summer institute is continued via online activities throughout the year. Advantages of the program include extending the professional development time, promoting implementation of activities in participants' classrooms throughout the year, and a decrease in teachers' feelings of isolation. Some difficulties were overcome by working with administrators, and a similar program for administrators is in the planning stages.

Summer institutes provide an opportunity for teachers to work together to develop and share skills and knowledge in a specific area or topic. Frances K. Bailie and Catherine M. Ricardo discuss the growing emphasis on standards-based education at the national and state (New York) level. They then describe how participants in the Iona College Summer Institute study and create WebQuests as a way to use technology to meet new assessment standards. Descriptions of some of these products are presented, as is the URL at which they may be found.

Blanche O'Bannon describes how WebQuests, "a structured format in which students participate in the retrieval of information to construct learning," are being used in both graduate and undergraduate teacher education courses. She provides background information about WebQuests, discusses advantages of having students create (or explore) these, and includes some student reactions to the use of WebQuests.

Curriculum development is one of the key areas in education, and there are many different approaches to helping teachers learn to integrate technology into curriculum. Craig A. Cunningham, Frada Boxer, and Ellen Dairyko describe the Web Institute for Teachers, a professional development institute which emphasizes the importance of teachers developing curriculum for their specific students, and they show how the institute facilitates this. The authors conclude with 7 specific suggestions for others who wish to implement similar programs.

Maria del Carmen Malbrán and Claudia Mariela Villar present a brief project report, describing the theoretical background and some design considerations for a project aimed at building a virtual learning environment on the Internet. Based on findings that university teachers and graduates have limited knowledge about use of the Internet, four strategies for Internet use are presented.

Online assessment is an issue of growing importance. David Zimmerman describes an innovative approach to providing online opportunities for assessment. He presents results of a questionnaire that was administered to students who took online written masters comprehensive examinations. Results indicated positive student reactions to the experience. Comparison of exams given in person with those given by e-mail revealed comparable scores.

An essential requirement for any type of online activity is support, and Norm Nicolson, Teresa Macklin, and Curt Cochran describe an approach that they find effective. They use an "Emergency Room" analogy to explain how the helpdesk at their institution has expanded to provide online assistance for emergency permit students throughout the state. Rigorous training, sophisticated communications infrastructure, and a supportive and empathetic approach have been found to be essential to the success of the program. Lessons learned and some possible future directions are described, and may provide suggestions for other institutions.

This section concludes with a brief report about a study to be conducted. Rosa Miriam Ponce Meza and M. Farias-Elinos describe how their research study will examine undergraduates' use of the Internet to "help them to train their thinking, decision making, and information processing skills."

The papers in this section show both the variety and the similarity of thinking by persons using the Internet for online activities. Many of the themes in these papers have been similar, but the approaches have differed. As new technologies and methodologies arise, educators continue to share their experiences, in person, in print, and online. This truly contributes to ongoing professional development for all of us.

Using Qualitative Research Methods to Study Preservice Teachers' Use of a Computer Conference

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Abstract: This study examined the nature of preservice teachers' perspectives on, engagement with, and use of a computer conference during a one-year, graduate-level, teacher certification program. The guiding question was, "What is the role of a computer conference when the participants have the opportunity to interact face-to-face?" The interpretive research paradigm was used to provide a fuller picture of the preservice teachers' experiences, and most data came from face-to-face interviews rather than from the conference transcript. One of the main findings was the participants' perception of ownership over the conference in contrast to the in-class seminar which they felt was more controlled by the faculty. Thus the interns' views speak as much to the nature of the face-to-face seminar as they do to the computer conference, and to the need to continuously assess the contributions of both as well as the interactions between the two environments.

Introduction

This study examined the nature of preservice teachers' use and non-use of a computer conference in one cohort of the Master of Arts with Certification (MAC) program at the University of Michigan. MAC is an intensive teacher certification program that runs for one calendar year, beginning in early July and ending the following June.

The guiding question of this study was, "What is the role of a computer conference when the participants have the opportunity to interact face-to-face?" All MAC interns met in seminars at least two times each week, most taught in the same schools, and many interacted on a face-to-face basis everyday. With so many chances to speak with their colleagues, I wondered why and how they would use a computer conference. Ultimately, the study focused on the interns' perceptions of ownership of the MAC computer conference and the face-to-face seminar. These two arenas are discussed in greater detail below.

The Study

A World Wide Web-based computer conference was created prior to the start of the MAC program, and was made available to all interns and faculty. The conference was run on a Unix-based server at the School of Education, using a modified version of the World Wide Web-based freeware, "HyperNews." HyperNews allows for multiple threaded discussions, hyperlinks to other Web sites, and the inclusion of images, video, and audio. This conference was password protected to prevent unauthorized access.

Like all University of Michigan students, interns were given free Internet accounts and, in addition, were given a tutorial on telecommunications at the University in general and on the MAC conference in particular. Thirty-one preservice teachers were originally enrolled in the MAC program and 16 of these individuals agreed to be interviewed for the study. All MAC interns had some computer experience, and all but one had used the Internet to some degree prior to entering the program.

The interns were originally assigned to participate in the conference at least twice each week as part of their program participation grade. After two months, however, several interns questioned this policy and the faculty agreed to remove the requirement while still encouraging intern participation in the conference.

The conceptual framework for this study draws upon the "iceberg metaphor" (also known as the "Michigan model") of educational telecommunications (Scott 1999). The iceberg metaphor describes the online communication between participants in a computer-mediated communications (CMC) exercise as similar to the 10 percent of an iceberg that rises above the water's surface. The remaining 90 percent of the learning experience takes place through the participants' engagement with the conference (i.e. those behaviors and perceptions that shape, but do not appear in, the online environment). Of course, this metaphor's 10-90 split is a heuristic emphasizing the importance of off-line engagement, and the actual percentages will vary by individual or group. However, this shift in focus, from online to off-line engagement, is key to this model as its primary value is to call attention to the possibility that people who focus attention solely on the what is visible (i.e. the communications that take place online) may miss a potentially important source of information (i.e. interaction that take place off-line).

The iceberg metaphor's implication for this study was to shift the focus from the conference transcript to extensive interviews with the participants. One important benefit of this shift in focus was the ability to speak to, and learn from, non-participants and "lurkers" (people who read, but rarely contribute to the conference). The study examined the interns' engagement with one another in the conference, and not the communication technologies that made these interactions possible.

This study primarily used naturalistic inquiry methods (Lincoln & Guba 1985), and related research techniques to get a "behind the scenes" look at the participants' perceptions of, and engagement with, this computer conference. Initially, I conducted a series of interviews (Mishler 1986; McCracken 1988) with the interns to better understand their perceptions of CMC in general, the MAC conference in particular, and the relative merits of computer-mediated versus face-to-face discussions as part of their professional development program. These interviews were then transcribed and analyzed.

Findings

The interns' comments indicated that while both are important, the computer conference offered distinct advantages over the face-to-face seminar. Three advantages are discussed below: Greater intern control over discussions, enhanced reflection and thoughtfulness, and freedom from temporal constraints.

	Total Messages Posted by Semester (Read-only not included)		
Intern	Summer	Fall	User Type
Jordan	21	30	Heavy
Amy	17	12	
Lloyd	13	18	
Chris	7	4	Moderate
Monique	5	15	
Anya	4	7	
Judy	1	0	Light
Ms. Blank	1	0	

Table 1: Selected Interns' Conference Contributions by Term

Greater Intern Control Over Discussions

Most of the interns who expressed an opinion on this issue believe that they had more control of the conference discussions than they did of the in-class discussions. "Monique" [all names are intern-selected pseudonyms] stated succinctly that, "I think sometimes we see the faculty dominating too much maybe, the in-class discussion." "Jordan," the conference's most prolific participant, commented that it is "...good that [the conference is] kind of open-ended. I think that for some people it would get to be kind of boring if every time you signed on there was a specific question asked by a staff member, and it was sort of a directed discussion. It seems like in class, most of the time, the discussions are pretty directed, or maybe one person will bring in a topic that we hadn't planned on, but then we'll stay on that topic! That will be it! To me it seems good that

somebody can bring up something that they just felt like they wanted to bring up." Jordan's comments also foreshadow another benefit of the computer-mediated discussion: Freedom from linear constraints of face-to-face discussions.

"Amy," a frequent conference contributor, noted that some faculty participation, especially scaffolding discussions and encouraging participants, was helpful: "At first it was like a lot of your stuff, but that was because there was no one on there, people weren't coming on. But I think you've kind of just let people roll with it, and you kind of encouraged people at first. You said, 'That's really interesting. Let's go with that,' and that was good."

Control, But Not Safety

Interestingly, interns' perceived control of the conference did not produce a discussion space where all participants felt free to speak without fear of being judged negatively by the faculty or even by their peers who might read their contributions.

While most interns agreed that they felt greater control in the conference, one intern, "Ms. Blank," indicated that she assumed faculty control over conference content, a belief that shaped her participation in the online discussion. For instance, one of Ms. Blank's colleagues suggested that the interns share a written reflection paper online. Ms. Blank's reaction to that suggestion was that "[it's] hard....at first when he said that, 'oh, [the faculty will] never let us do that.' Because I was thinking maybe [the faculty] wanted us to post our reflections as we were still working on the assignment, and I thought maybe [the faculty] won't like that because other people can draw too much from what others have said without thinking independently." This assumption of faculty control and monitoring of the conference may explain in part Ms. Blank's limited participation in the conference.

Another intern, "Judy," who read but rarely contributed to the conference, explained that concern over negative judgement by others greatly shaped her conference participation: "...I'm afraid of people judging me for what I'm saying, mainly thinking, "oh, she's stupid" or whatever....just with my self-introduction, I sat there for about a half an hour trying to think about what I wanted to say because I didn't want to be like real wordy, and I didn't want to be stupid, but I really looked at it." Unlike Ms. Blank, who was specifically concerned about the faculty's reaction to conference messages, Judy's concerns are more general, and seem to include faculty and intern perceptions. Judy's limited participation is understandable given her concerns over how others might judge her contributions.

Jordan also edited his messages, but feels that doing so is "a respect thing....Because you're talking to the group of people, some of whom you may be close friends with, and others may just have a more school-type relationship, you want to respect people, and make sure you don't put something up there that might possibly be offensive to somebody that you don't quite know as well."

Amy described how her judgement of the quality of her writing plays a role in deciding whether to post a comment to the conference: "...If I felt that I said something well, then I would put it up [on the conference]. If I didn't feel good about what I had written, it's just like writing a paper for all of my English classes. Some of them I handed in, and was like I really hate this paper....That kind of thing I would never put up [on the conference]..."

Enhanced Reflection and Thoughtfulness

Several interns felt the conference afforded more time to think about and compose one's message than the limited time allowed in classroom discussions. Ms. Blank said this was the case "... because people have more time to reflect on what they are going to say, and they can think more about what other people are saying, too. Because sometimes in class, one of the disadvantages is that you are trying to figure out what you are going to say and sometimes you don't, you know, the person who is talking before you, you don't even know what they are saying. Whereas on line you read everyone's stuff, you can really think about it and appreciate it."

More time to write and to read conference contributions contributed, in part, to some interns' assessment that the conference might be a better forum for sensitive or controversial topics than the face-to-face seminar. "Anya" noted that "I would much rather that someone else, if they disagree with me, not express it as vehemently as some of the people in our class do. But on the other hand, that's the way they do it. That's how

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they communicate and that's fine. So for me, that's one advantage of the Web page is that I have that distance." Monique concurs, adding "…that controversial things, like this whole racism thing, I think it's actually better to have it in the confer rather than face-to-face because you get a lot of people coming with a lot of baggage, and when you're face-to-face…you have the constant interruptions, and people trying to talk, screaming, shouting, whatever, whereas on the confer,…usually you have to think about what you are going to say before you send it out. So, usually it's well thought out and usually it's very, not unemotional, but at least kind of what you really thought about, what you are thinking about, but not, I don't know, off the cuff kind of thing.

Freedom From Temporal Constraints

The conference was available 24 hours a day which enabled participants to contribute whenever it was convenient, or, as "Lloyd" phrased it, "If I am feeling brilliant at 2 a.m., I can let it out on the [conference]." "Chris," a moderate conference user, agrees, and describes the reasoning behind his choice to participate in the conference late at night: "One of the greatest pros of [the conference] is that it allows, I mean I'm up late like you, and sometimes my best stuff comes out at that time. There's no discussion around. There's not even another MAC student around. Where can I go? I go to my journal, I can write it down on a scrap of paper, or I can stick it [in the conference]....I think [the conference is] very useful, and I hope that, time permitting, I'm going to get a lot more down, and maybe I will sort of focus and tighten what I have to say to make it more time-accessible to people."

The electronic discussion also freed the interns from the linear structure of in-class discussions, a point Jordan touched upon earlier. Lloyd expands upon this idea stating that "...a lot of times with in-class conversation, you'll want to respond to something that somebody says, but two other people had their hands up before you, and they take the conversation somewhere else, which is really neat–the way you have to keep on your toes and everything to keep up–but sometimes you may feel like you have something to say....With our discussion page you can insert your response wherever it's appropriate which I think is pretty cool because I'm sure there are plenty of times where people like me have wanted to say something in [class], didn't get to fit it in because things shifted. So while the stand-alone nature [of a conference discussion] doesn't have the same flow as a natural face-to-face discussion, it does have that neat feature. It doesn't suffer from the same temporal requirements of a discussion which is pretty cool."

Amy develops Lloyd's comment regarding the threaded structure of the computer-mediated conference and contrasts the linear nature of face-to-face discussions with the flexible structure of the conference: "…(Y)ou may have someone who has the start of a new thread, and people can keep reacting to that indefinitely, basically….There can be more branches that are occurring at the same time whereas in a discussion there's it's like one piece whereas in electronic you can have several pieces." Although the nature of computer-mediated discussion has its limitations (discussed below), Lloyd and Amy find advantages in its format that add useful dimensions to their discussions.

Conference Limitations

The previous section describes the MAC computer conference's strengths as seen by the interns. This section will present the interns' perceptions of the conference's weaknesses. The interns noted several limitations to the computer conference including lack of participation by their peers, and limitations of communicating via computer.

Lack of Participation

A common complaint by the interns was the lack of conference participation by their colleagues. Amy sees pros and cons to the lack of participation, and likens lack of conference participation to keeping quiet in classroom discussions: "In the sense of volume, [the limited number of people actively using the conference is] probably a positive because it makes it easier to get through it when you get on there. But, as far as people putting their opinion up there, it's definitely lacking. But I think that there are people who you rarely hear from in the seminar so it's not like it's that different really. [laughs] It's not entirely different."

Lack of participation by other interns not only keeps their opinions out of the discussion, but Lloyd feels that their lack of input inhibits his participation: "The content [of the conference] just doesn't seem to change quickly enough to merit, not to merit, I'm certain I can come up with something to say, something interesting, and relevant to say every time, but sometime I get on, and I'm going, 'I posted the last one in this category, and I'm don't know if I should say something again.'" Lloyd's comment speaks to a Catch-22 of conference participation: There is little incentive, even for active participants, to continue to post messages that receive little or no response. Jordan agrees, and expressed his frustration that the lack of new messages by others decreased his interest in logging on to the conference: " I check [the conference] about twice a week right now. I used to check it a little bit more, but since it hasn't been real active lately, sometimes you check it, and you get pissed off because there isn't nothing new right there [laughs] so I cut my access down a little bit."

Jordan seems to see conference participation as part of the interns' professional development and as an alternative means of keeping in touch when busy schedules conspire to keep people from talking face-to-face: "I'm a bit frustrated with the level of commitment on the part of some of our classmates....I think that just kind of common courtesy. The way I look at it is we're all sort of equals in the workplace as a way to compare it, so if you're gone for a week, you let everybody know. We're all each other's bosses in a sense, so you can talk about it in a carpool, but that's only a couple of people who are at your school. Everybody doesn't know what's going on. Without getting too personal, I see it as a courtesy, 'Sorry I missed you guys last week. I just had a flu. How's everything going?'"

Limitations of the Medium

It was mentioned previously that some interns liked the distance the asynchronous computer conference afforded them when discussing controversial topics. Jordan disagrees, noting that the emotional impact of one's message is dampened in a computer-mediated forum: "Sometimes [posting an emotional message to the conference] makes it more clear, maybe, just in a way of comprehending it, but it can lose the power of it completely. Sometimes the emotion is what gets the message across, what you're trying to talk about whereas other times it's just the words, specifically the content of the words without, I don't know if you can always take things out of context entirely, but sometimes the context can confuse what the person really means. It works both ways." Anya agrees that there are trade-offs when having an emotional discussion face-to-face versus on a computer conference: "There's really a difference between looking at someone, and seeing their immediate reaction, and getting a delayed reaction from the e-mail message or on the Web or whatever. But sometimes that's a good thing, having a little distance."

Chris mentioned that the process of composing and inputting text for the conference limited his participation and, he suspects, that of his colleagues: "(O)h, I like [the conference]....I think the drawback to it is it's slow, and I think people, including myself, are lazy about it especially when they're not good typists. So that's sometimes difficult....just typing it out, and again, it takes longer when you're really going to sit down and write something utilizing paragraphs, and good sentence structure, and syntax, and grammar, etc., it takes longer than it would if you were just speaking."

Conclusion

Most interns agreed that the in-class seminars were overly controlled by the faculty whereas they (the interns) controlled the computer conference (i.e. no assigned topics, faculty presence was minimal, and they could hold discussions on any topic). The conference provided a forum where the interns could direct their education with an appropriate amount of support, and lack of interference, from the faculty. This perception of conference ownership seems to primarily derive from the way both the seminar and the computer conference were structured, and not from any inherent traits of computer-mediated communications. Thus, the participants' views speak as much to the nature of the face-to-face seminars as they do to the conference itself, and to the need to continuously assess the contributions of both as well as the interactions between the two environments. As a post-script to the study, this finding (i.e. the perceived difference in intern ownership of the conference vis-à-vis the in-class seminars) initiated discussion among the MAC faculty to revise the seminar format to increase preservice teacher participation and ownership of the in-class sessions.

The nature of the concept of ownership is worth considering. Interns spoke of their apprehension of being negatively judged by both faculty members and their colleagues. On one hand, the matter might simply

be a question of whether interns or the faculty "own" the discussion. On the other hand, the issue may be more a matter of a sub-set of students establishing "ownership" in a way that left other students feeling "owned."

Other advantages of the conference were also described. These benefits included enhanced reflection and thoughtfulness afforded by the asynchronous nature of the electronic forum. Participants had more time to think about the messages they read, and gave them more time to compose their responses. These characteristics contributed, in part, to some interns' assessment that the conference might be a better forum for sensitive or controversial topics than the face-to-face seminar. The conference was available around the clock which enabled participants to contribute whenever it was convenient, even when they were "feeling brilliant at 2 a.m." The electronic discussion also freed the interns from the linear structure of in-class discussions. They could revisit past discussions if necessary, and respond to the messages in any order they wished. One intern did point out that the archived nature of the conference that made this type of engagement possible had a potentially darker side: That once a message was submitted to the conference, it was "out there" to be read at any time by any one with access. It is conceivable that this concern shaped some interns' participation, and may help explain the care with which so many of the interns composed and edited their messages.

Limitations of the conference included lack of participation by other interns which worked to lesson the motivation of even heavy users to contribute to the conference. The limitations of the medium were also identified as negative elements including the diminished emotional impact of messages and the slow pace of discussions.

This study used interviews exclusively to better assess the value of this technique in understanding the nature of interns' engagement with a computer conference. This energy- and time-intensive method was rewarded by the "amplification" of the participants' voices and resulting insights into the use, and especially the non-use, of the conference. It is doubtful that some of the findings could have been uncovered if not for the additional insight provided by these extended interviews. However, the need for some analysis of the online discourse seems clear. Indeed, the online discourse can provide important insight into connections among the learners participating in the conference. To link this back to the iceberg model, the goal of such research is to make more of the iceberg visible by bringing to light the perceptions of, and engagement with, computer conferencing. This type of investigation is useful both to enhance our understanding of how these technologies are used, and to inform the development of more appropriate online discussion formats that take into account the actual use of the technology, and perhaps to suggest ways for improving off-line interactions.

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Interaction and Collaboration among Teachers: On the Use of a Knowledge Based Network

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Abstract: The goal of this study is to develop guidelines for creating an environment in which teachers can communally build knowledge. A design perspective is used to find ways to support teachers in their efforts to synthesise information, to explore ideas from multiple perspectives, to examine knowledge at different levels of abstraction and to support co-ordinated, coherent and collaborative construction of knowledge. The conditions for creating a communal database, are examined from a situated learning perspective. This means that the context in which knowledge building takes place, which include interpersonal, social, technological and other situational factors, are taken into account.

Introduction

In many cases, educational innovations have led to unsatisfactory results (Fullan, 1991, 1993; Hargreaves, 1994). Research has shown that educational innovations are difficult to realise, jointly due to the isolated work of teachers (Fullan, 1991; Lortie, 1975). Lieberman and Miller (1991) point out that isolated work of teachers "has been held responsible for teachers' anxiety about their effectiveness, their fearfulness of external evaluation and their immersion in the immediacy of their own classrooms. This, in turn, has been felt to explain teachers' reluctance to explore and embrace alternative teaching approaches, which may challenge or move beyond what they already know and do" (p. 227). Educational researchers found that collaboration between teachers can support and promote innovation in schools (Rosenholz, 1989; Van den Berg & Sleegers, 1996). Berman & McLaughin (1977) point out that the support, feedback and encouragement teachers get from their colleagues stimulate them to develop further.

School conditions that stimulate collaboration of teachers and contribute to a successful implementation of educational reforms are often lacking. It is assumed that electronic networks can stimulate teachers' collaboration (Smith Lea & Scardamalia, 1997). Empirical data about the collaboration of teachers through the use of electronic networks, are still lacking.

In the department of Agricultural Education in Wageningen, research is done to get insight in how Web Knowledge Forum (an interactive, shared database) can be used to create teacher discourse on implementing active learning in practise. Questions to be answered are: (1) What conditions are required to create a communal database? (2) What are the strengths and weaknesses of Knowledge Forum in promoting communal knowledge building among teachers? In this paper the theoretical basis and the research methodology are discussed.

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Theoretical Background

In this article theories concerning constructivism and situated learning are used to examine the way learners construct their knowledge through the use of the electronic network Web Knowledge Forum (WebKF).

Constructivist View of Learning

Constructivism views knowledge as personally constructed through representations, which are the internal mental actions of the learner. In other words, learners construct knowledge through intellectual activity. New knowledge must be built through the socially dynamic and interpersonal interplay of experiences, beliefs, and prior knowledge each individual possesses and shares within a community of collaborative learners. Learners should elaborate new information and relate this to their prior knowledge, thus constructing new internal representations of the information being presented (see Biemans, 1997). This makes it possible to retain simple information and to understand complex matters.
A model for applying a constructivist approach to learning in ICT, is proposed by Ewing, Dowling and Coutts (1999). Principal features of constructivism are adopted into a model, which has been successfully applied to a practical example. An application of the proposed model will be attempted in this study.

Situated Learning

Lave (1988) states that learning as it normally occurs is a function of the activity, context and culture in which it occurs. Social interaction is an essential component of situated learning. Learners become involved in a "community of practice" which represents certain beliefs and behaviours acquired (Lave & Wenger, 1991, p. 55). Complex practises can be learned effectively and easily where the social context is evident and supportive (Brown & Duguid, 1993). The beginner moves from the periphery of this community to its centre. The learner becomes more active and engaged within the culture and hence assumes the role of an expert. Furthermore, situated learning is usually unintentional rather than deliberate. These theories are what Lave and Wenger (1991) call the process of legitimate "peripheral participation (p.29)".

There are a variety of factors which might influence the way learners effectively interact with each other and the topic being discussed, including their background, knowledge, attitudes, personal previous experiences with computers and with collaborative work, interests, anxiety, and motivations (Young, 1998).

Computer Supported Collaborative Learning

Principles of shared knowledge building and CSCL (see Scardimalia & Bereiter, 1994) are consistent with a constructivist view of learning. In CSCL, active learner participation is required. Knowledge is the result of the individual making meaning out of information and expanding individually held knowledge through the interaction of other learners in the social context of a learning community. The social component of knowledge building is the catalyst in the process: as an individual learner makes sense of new information or experience, it is expressed to others who actively enter into the knowledge-building dialogue to confirm, modify, question, contradict, or correct shared information. In this collaborative knowledge-building process, all partners are acting to make personal and community meaning of new information as different participants share ideas, concepts and principles (Resta, 1998). According to Brown and Parlinscar (1989) the presence of other learners provides participants with the means to gauge their own progress which, in turn, assists them in identifying their relative strength and weaknesses and permits them the insight necessary to improve their own learning.
Further on, rich contexts that reflect the real world and that are closely related as possible to contexts in which this knowledge would subsequently be used can be provided. Participants can discuss authentic problems.

Web Knowledge Forum

In this study the CSCL environment 'Web Knowledge Forum' (WebKF) is used. WebKF has been developed at the Ontario Institute for Studies in Education. It is an environment for building, articulating, exploring and structuring knowledge (Scardamalia & Bereiter, 1994). The system contains tools for text and chart processing, and a central part of the system is a communal database for producing, searching, classifying and linking knowledge. Participant's can share cognitive achievement by writing notes, creating charts, referring to WebPages, reading and commenting on each other's productions. Scardamalia et al. (1994) argued that a very effective way of learning to understand and explain a knowledge object is to generate another object (e.g. hypotheses, theory) based on it. Therefor, WebKF is designed to engage participants with an extensive process of setting up research questions, generating and improving their own intuitive explanations and searching for scientific information. In this manner participants' prior knowledge can develop to more sophisticated forms of understanding and thinking. Thus, it seems that the CSILE environment has a potential to facilitate participation in higher-level practices of inquiry.

Methodology

In order to gain a comprehensive and in-depth understanding of the process of collaboration, a qualitative research methodology is adopted in this study. Within postpositivist paradigms, this study is described as interpretative and descriptive in nature. The study is conducted in five phases: every stage starts with a workshop in which the formal stage is evaluated individually and collectively and goals for the coming period are set, followed up by two months discussing on the network. The themes being discussed are directly related to implement innovations, specifically active learning, into schools.

Data sources consist of transcripts of all notes, results of pre- and post-communal database questionnaires, computer generated data sources, and notes from semi-structured interviews with participants. The questionnaires are used to gather participants' demographic data, computer experiences and attitude towards working collaboratively with colleagues, as well as the experiences they had with factors influencing the participation and outcomes of the network, such as the medium, themes discussed, the task of the coach, and the workshops.

Effects measured are concerned with the quantity and quality of contributions, as well as the interconnectedness of the notes. To analyse participation and interaction the Analytic Toolkit (ATK), a program developed at the Ontario Institute for Studies in Education, is used.

The qualitative study is currently in progress. It is hoped that the results of the study will provide insights into conditions needed to create a communal database to promote communal knowledge building among teachers. Suggestions for future collaboration projects and suggestions for further research will be indicated for designing an environment, which stimulates teachers to work collaboratively towards innovative educational goals.

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Assessing the Impact of a Large-Scale Online Teacher Professional Development Community

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Abstract: TAPPED IN™ is an online community that supports teachers' professional growth through both formal education and professional development programs provided by a coalition of partner organizations and informal activities that occur year-round. The authors of this paper are members of both the community and a research team investigating whether and how the design of our online environment can help foster a culture of learning within a large and diverse community of education professionals. The community is now three years old, and we believe it is time to examine its impact more closely. In this paper, we review data collected from a survey that was recently sent to the educators in the community. Specifically, we examine how experiences in TAPPED IN affect teaching and teachers.

Overview of TAPPED IN

The concept of *community of practice* has become a major theme of teacher professional development (TPD). Advocates claim that communities of practice can be powerful catalysts for enabling teachers to improve their practice (Lieberman, 1996; Hawkins, 1999) and for innovative TPD efforts to achieve sustainability and scalability (Schlager & Schank, 1997; Schlager, Fusco, & Schank, in press). Currently, professional development in the teaching profession differs from that in most other professions in that the process is heavily skewed toward pockets of formal, highly structured activities outside the context of their actual work (Loucks-Horsley, Hewson, Love, & Stiles, 1998).

Similarly, most teacher education programs provide students with little access to the larger community of education professionals outside the university, at best providing internships at a local school. To understand the profession and become contributing members of the teaching community of practice, preservice teachers need access to that community on a sustained basis. Although we cannot change school policies or find more time for professional development, TAPPED IN, as an education community of practice, can help provide opportunities and mechanisms for teachers of all levels to overcome their isolation and make more effective use of time spent on professional growth.

Our view is that professional development is a lifelong process in which teachers' needs change from year to year. Our goal is to begin supporting teachers during their preservice education and continue to serve them as they become leaders in their professional community. We envision a year-round TPD process that balances formal TPD efforts and informal professional activities that are characteristic of other professional communities of practice. Our approach is to invite organizations representing divergent perspectives to be tenants in the TAPPED IN environment and use it to help accomplish their own TPD agendas. In this way, online tools and practices become part of their institutional culture rather than tangential add-ons. If one tenant organization leaves, another can take its place, and the community continues evolving over time as individual groups form and disband and projects begin and end. Each organization leaves behind a bit of its expertise in the form of members who continue to participate in the community, thus enabling the community to become an ever-widening source of expertise.

We currently support a growing community of 15 organizations and over 6,000 members. On any given day in TAPPED IN, one can observe teachers, administrators, district coordinators, state staff, staff developers, university faculty, graduate students, undergraduates, researchers, and the occasional curious guest being resources for one another. Members can be central or peripheral participants in the community. This

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ability to participate peripherally (Lave & Wenger, 1991) in the activities of others (both as a resource and as a seeker of assistance) is a hallmark of a community of practice and one that we believe is essential to establishing and sustaining professional relationships. By sharing space in TAPPED IN (as opposed to locking teachers into their own proprietary environments), the organizations enable their teachers to have rich interactions with a wide variety of other educators.

Our technology is a platform-independent, Web-based, real-time environment designed to meet the needs of a large and diverse community of education professionals (see Schlager & Schank, 1997, for a more complete description: http://www.tappedin.org/info/cscl97.html). Activities occur in virtual rooms that provide a basic yet powerful set of communication mechanisms (directing speech to specific people, whispering, paging, emoting) and support tools (whiteboards, notes, tape recorders, and Web viewers). The structure of the TAPPED IN community and its environment allow great flexibility in designing opportunities for pre- and in-service teachers to interact with one another and share information, both within and across institutional boundaries.

As technology proliferates in schools, the issue of how best to prepare teachers to use it effectively to support their learning and that of their students has come into the fore. For educators to embrace technology and integrate it into their classrooms, they must explore, experiment, and collaborate as a community. We have designed TAPPED IN to be a place that encourages ongoing experimentation and collaboration, and that offers immediate support to teachers as they learn the ropes of both the technology and the community. The TAPPED IN community has been growing for over three years. Since we began conducting community-wide activities, an average of 15% (with a range between 10% and 20%) of members log in at least once each month. In this paper we will present a summary of who our members are, what kinds of activities they engage in online, and how they use technology in their classrooms. In addition, we examine the relationship between how often a member logs in and their perceptions of the benefits they gain from their TAPPED IN experiences. Though a time investment is required before most users become comfortable with the environment, we believe (and many of our experienced members tell us) that the return is well worth the effort. We hypothesize that those who rate themselves as more frequent users of TAPPED IN will report lower levels of professional isolation and positive effects on their knowledge of subject area and teaching techniques.

Survey Collection and Data

Our survey was developed to help us learn who our members are and how their experiences in TAPPED IN have affected their professional lives. We invited every member of the community to fill out a 133-question survey. We are collecting data on (a) standard demographics and professional development activities, (b) technology use, and skill rating, and (c) TAPPED IN use, affordances, and barriers. We began collecting data on August 30, 1999, online through Web-based forms (available to members at their convenience). We made available a .pdf file for members to download and mail or fax back to us. We also offered to Email, fax, or mail a hard copy of the survey to any member who requested it. Two announcements were Emailed to all the members of the community; reminders were also included in the monthly e-mailings and on the log-in page. The data being examined in this paper were collected through October 28, 1999. Data collection is still ongoing; the reader should consider this paper as a preliminary look at the survey results.

The demographics of the survey sample closely match the overall membership. The data set includes 851 survey responses from 282 males (34%) and 550 females (66%); 19 respondents did not specify gender. The gender breakdown of all members (as of 11/29/99) is 4188 females (64.9%) and 2262 males (35.0%). Average age of the respondents was 43.72 (SD = 9.74), with a range of 21-67. Table 1 shows that the sample's breakdown is comparable to that of the entire community, and that the sample represents the different occupation categories in TAPPED IN. Although the majority of members are teachers, we believe that it is important to have a diverse community of education professionals. Having administrators, librarians, subject area experts, professional development organizations, and others online allows for informal conversations where ideas can be exchanged. In addition, we have a wide range of experience among the teachers. The respondents who listed teaching as their primary occupation have taught from as little as half a year fulltime to 39 years full time with 25% having taught 5 years or less, 50% having taught 13 years or less, and 75% having taught 21 years or less. Table 2 shows that the different subject areas taught by the teachers in TAPPED IN represents a cross-section of the teaching profession.

In terms of technology skills, 2.2% of respondents rated themselves as having minimal Internet skills, 21.5% as having moderate, 48.5% as having strong, and 27.8% as having expert Internet skills. Table 3

presents information about reported online technology use by our respondents, and Table 4 presents information about the use of computers by teachers in relationship to their classroom.

Occupation	n	Percent of respondents	Population as of 9/99
K-4	98	11.8	18.9[a]
5-6	64	7.7	11.4[a]
7-8	58	7.0	
9-12	125	15.1	13.9
K-12 Teacher (total)	(345)	(41.7)	(44.4)
Community College	12	1.4	n/a
School of Ed. Faculty	27	3.3	2.5
University Faculty (other)	32	3.9	4.4
Library/Media Specialist	37	4.5	5.5
Professional Dev. Staff	31	3.7	4.9
Tech. or Curr. Coordinator	83	10	2.5[b]
School Administration	28	3.4	3.8
15 other occupations on survey	41	20.0	
Other	64	7.7	20.1
Missing	23	n/a	n/a

[a]Because of differences in the wording of occupations, we can't be sure how teachers classified themselves in grades 5-6. On our membership form 18.9% identified themselves as elementary teachers, and 11.4% that identified themselves as middle school teachers on our membership form. On the survey, the grades were specified.
[b]Just Technology Coordinators.

Table 1: Survey respondent occupations as compared with occupation breakdown of the community of TAPPED IN.

Multiple Subjects	168	Computing	104	Physical Education	25
Science	122	Programming	11	Industrial Arts	7
Language Arts	82	Mathematics	109	Foreign Language	19
Fine Arts	46	Social Studies	92	Other	46

Table 2: Subjects taught by the respondents in the 98-99 school year (respondents could select all that applied).

	Percent of respondents				
How often do you do the following?	Never	Once or twice	Monthly	Weekly	More often than weekly
Use email	0.1	0.2	0.1	2.7	96.8
Access the WWW	0	0.1	7.8	7.1	91.9
Use WWW search tools	0.1	1.0	4.4	15.0	79.5
Participate in Listservs, Discussion Boards or Newsgroups	11.9	15.5	10.4	11.7	50.4
Participate in online chat rooms other than TAPPED IN	33.9	33.1	15.4	9.0	8.6
Participate in an online commuity other than TAPPED IN	39.0	26.1	11.4	9.7	13.8

Table 3: Frequency of selected online activities of survey respondents. (The n's for the questions range from 832 to 837.)

In which of the following ways do you use computers to prepare for teaching your classes or in other professional activities?	Percent of respondents				
	Never	Once or twice	Monthly	Weekly	More often than weekly
Record or calculate student grades	25.2	8.1	9.6	17.3	39.8
Make handouts for students	1.2	3.4	11.4	30.3	53.6
Correspond with parents	15.7	17.2	29.7	19.9	17.4
Get information or pictures from the Internet for use in lessons	5.3	7.0	12.4	31.3	43.4
Use camcorders, digital cameras or scanners to prepare for the class	33.9	33.1	15.4	9.0	8.6
Exchange files with other teachers	39.0	26.1	11.4	9.7	13.8
Post student work, suggestions for resources or ideas	34.0	25.9	16.5	11.8	11.8

Table 4: Frequency of computer use by teachers on professional activities. (The n's range from 405 to 412.)

Barrier	N	Mean	SD	Barrier	N	Mean	SD
Lack of computer at school	808	1.42	.93	Difficulty learning the TAPPED IN commands	804	2.1	.92
Lack of computer at home	809	1.2	.66	Not comfortable with real-time (chat) interaction style	808	1.68	.95
Lack of Internet access at work	802	1.48	1.01	Difficulty arranging to meet others in TAPPED IN	805	1.85	1.02
Lack of Internet access at home	806	1.21	.70	Lack of time to participate in online activities	820	2.85	1.09
Lack of experience/skill using the Internet	804	1.21	.54	Lack of administration support for it at my workplace	796	1.68	1.05
Difficulty logging into TAPPED IN	817	1.71	.94	Lack of useful resources or activities	790	1.5	.83
Having to type to communicate	800	1.42	.72	Lack of online help from TAPPED IN staff	788	1.25	.63
Difficulty learning to navigate the environment	804	1.98	.92				

Table 5: Average ratings of barriers to using TAPPED IN for the whole sample. The question asked was, "Which of the following are barriers to participating in TAPPED IN?" Possible responses: 1=Not a Barrier, 2=Minor Barrier, 3=Moderate Barrier, 4=Major Barrier

Impact of TAPPED IN	R	N
Reducing professional isolation	.47	789
Professional Relationships	.48	789
Participation in professional discourse with other educators	.49	786
Changes in how I teach	.37	782
Changes in what I teach	.32	786
Knowledge of new subject matter	.37	784
Use of technology in my teaching	.35	779
Ability to find web resources	.31	793

The scale for the independent variable of how often have you logged into TAPPED IN was: 1=Never, 2=Once or Twice, 3= Less than one a month, 4=At least once a month, 5=At least once a week, 6=More than once per week. The scale for the dependent variables was: 1=Very negative, 2=Somewhat negative, 3=No impact, 4=Somewhat positive, 5=Very positive. Higher values of R indicate a stronger relationship between the time spent online and the positive impact that members report from TAPPED IN.

Table 6: Correlation between how often a member logs in and impact of TAPPED IN.

Correlations were computed between the self-reported data of how often a member logs in and the perceived impact that TAPPED IN has in different areas of an education professional's life to test our hypothesis that the more time spent online, the greater the perceived impact. We report Spearman's Rho correlations. See Table 6 for the actual areas of professional life and for correlation coefficients. All of the correlations reported differed significantly from zero ($p < .0001$).

Discussion

Our survey was developed to help us learn more about our members. We were pleased to learn that we have teachers with all levels of experience in TAPPED IN, from the brand new teacher to the experienced veteran of 39 years. We learned that 75% of the respondents rated their own Internet skills as strong or expert, and that 96.8% used email, 91.9% accessed the WWW and 79.5% used WWW search tools more often than weekly. In addition, the teachers also reported using technology in many aspects of their profession. Over 65% of our sample record or calculate student grades using a computer monthly or more often; 95% of our sample make handouts for students using a computer monthly or more often; 80% get information or pictures from the Internet for use in lessons monthly or more often; and 60% correspond with parents using a computer monthly or more often. Smaller percentage use camcorders, digital cameras or scanners to prepare for the class (33%), exchange files with other teachers, post student work (35%), suggestions for resources or ideas or activities (39%) at least monthly. Our findings suggest that our members are more frequent and facile users of technology than one would expect in the overall teaching population. Becker's (1999) national survey of teachers' technology use collected in Spring of 1998 indicated that 68% of teachers had used the Internet to find information for lessons, and 28% of teachers did this more often than weekly. Over 95% of our respondents used the Internet to gather information for their lessons, and 43.4% of our respondents did this more often than weekly. One difference that must be considered is that our data were collected a year and one-half later.

What motivates people to use and prevents people from using TAPPED IN for online professional development are two areas we hope the survey will elucidate. In this paper we focused on the barriers. Respondents indicated that lack of time for online activities was rated the most significant barrier that inhibits their use of TAPPED IN. Although online interactions can decrease the time needed for attending a meeting (by eliminating driving time), there are still a finite number of hours in a day. Time can be made available through more professional development days, by paying for time over the summer, or by offering credit (which can result in salary increases), but these are things that will need to be considered at the level of school districts and states. Future analyses will focus on organizations that are currently providing incentives (stipends and district credit) for their members' use of TAPPED IN to determine whether that helps lower the barrier of lack of time. We hypothesize that when online interactions are a central or required part of professional development, time becomes less of a perceived barrier. When online interactions are another activity that teachers would like to take part in, they receive less priority and become one of the items perpetually on that "list of things to do." In addition, we believe that providing credit or a stipend for the first few times online when the learning curve is steepest may reduce the feeling that this is "wasted" time.

The next two most highly ranked barriers, difficulty learning the commands and difficulty in learning to navigate TAPPED IN, are issues that we as designers are working to resolve. We are developing a " (new person) interface to scaffold the experience for new or infrequent users. We hope these efforts will help reduce some of the time necessary to feel comfortable online. Technological advances and standardization in Java and Web browsers will help us address our fourth most significant barrier, difficulty in logging into TAPPED IN. We have a one-click log-in process, but because of differences in Web browsers and versions of browsers it is difficult to develop a client that works smoothly for all versions, and some members experience difficulty. The fifth most significant barrier cited by our respondents is lack of administrative support for online activity. We, and many others, are working to change this situation by demonstrating the benefits of using technology and integrating it into the daily lives of both education professionals and their students.

The results from this initial exploration of our survey data support our belief that online professional interactions have a positive impact on educators. We found evidence that the more often a member logs in (based on self-report), the greater the perceived reduction of professional isolation and the higher the positive impact on teaching practices (e.g., how I teach and what I teach). Getting teachers to experiment in the classroom is viewed as the first step toward that end. First, teachers must be aware of options for adjusting their practice. Next, they must make a change in content, method, or some other facet of their teaching. Whether the change can be deemed an improvement in teaching is not measurable by our data. Our data

indicate only that members report a positive impact on changes in how and what is taught, the use of technology in teaching, knowledge of subject area resources, and knowledge of new teaching techniques and that these impacts are correlated positively with increased TAPPED IN use.

These preliminary survey findings are consistent with the anecdotal reports we receive from members each week, the observations staff make each day, and the more formal reports we receive from our partner organizations each year. Our future analyses will identify factors that contribute to the overall positive perception of TAPPED IN. We will examine the large section of the survey devoted to which activities in TAPPED IN were valuable to members and how frequently members participated in activities. We will also be investigating the relationship of group membership (which organization a member is affiliated with). Some of our partner organizations offer a stipend or credit for participation in TAPPED IN, and we will examine the effect of this practice on the barriers to participation and the perceived benefits of TAPPED IN. We will continue to report our findings and make adjustments to our community design as we continue to develop our model for professional development.

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Web-Based Learning: Moving Beyond the Internet as a Research Tool

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Abstract

As schools continue to make efforts to hook all classrooms to the Internet, teachers need to learn ways to integrate the Web into their teaching. WebQuests, virtual fieldtrips, intercultural exchange, and collaborative research projects are available online for teachers to adapt and use. Online simulations are available on several different topics from the stock market to managing a rock band to dissecting a frog. In addition to learning about these resources, teachers need experience with different tools for communicating with others. The use of these tools will allow them to collaborate with other educators and expand their own knowledge of web-based resources. This paper explores an online course that engaged teachers in learning about online simulations, intercultural exchange projects, and collaborative research projects though their direct participation in these activities. Tools used for communication with each other and with the instructor included threaded discussions, groupware, and MOOs.

Designing the Course

In the Fall of 1999, the authors of this paper were challenged with designing and teaching a web-based course for teachers enrolled in the Integrating Technology in Schools (ITS) Program. The students were in their third semester of a four semesters cohort program that resulted in a Masters in Education degree. The web-based course was to be taught entirely online. Although the students would meet face-to-face once a week with another instructor, their only interaction with the authors would be online.

Several ideas for the course were discussed and discarded. Two questions were foremost in the minds of the instructors: What did teachers need to know to use the Web in their classrooms and what web-based tools were available for teachers to use? These questions became the cornerstone for the design of the course.

A recent study conducted by the Milken Exchange provided an answer for the first question: what did teachers need to know to use the Web in their classrooms? In this study, seventy-eight percent of the teachers participating indicated they use the Internet to find information or to conduct research. Thirteen percent said they send and receive e-mail while only seven percent use the Internet to assign work to students and four percent use it to communicate with experts (Jerald, 1998). Despite the vast resources of problem-based activities available on the Web, few teachers seem to be integrating these projects into their teaching.

Although there are multiple reasons as to why teachers are not making use of web-based projects, one possible answer is they are unaware of such activities. Therefore, it was decided that the teachers in the ITS Program should be exposed to the various web-based projects available for the K-12 classroom. The authors choose to focus the content of the course on online simulations, intercultural exchange projects, and collaborative research projects. WebQuests were not included because the students had

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learned about them in a previous semester. Virtual Fieldtrips were not included because it was felt students could learn about these on their own.

The answer to the second question, what web-based tools were available for teachers to use, required a little more research. After looking at several options, the authors chose a combination of synchronous and asynchronous tools. The students used Townhall (the university's asynchronous threaded discussion bulletin board – http://townhall.gmu.edu) to discuss the class readings and for socialization. A groupware program called NetMeeting (http://www.microsoft.com/downloads/default.asp?) was used for collaborative writing and sharing of ideas. TappedIn (http://www.tappedin.org), a MOO that focuses on educators' staff development, was used to plan small group activities and for collaboration on projects. These tools were chosen because students were familiar with them from a previous semester and there was no cost associated with using these tools.

Structure of the Course

Once the tools and content were decided, the authors turned their attention to the structure of the course. The course was designed with a variety of asynchronous and synchronous activities. However, the majority of the interaction was asynchronous. The instructors knew students were taking two other courses during this semester and knew the amount of workload involved. It was felt that requiring students to engage in synchronous interactions would be difficult for them so synchronous activities were kept to a minimum originally. This was altered based on feedback from students.

Students were provided links to several online resources that provided an overview of web-based learning, examples of web-based projects for students to explore, and articles explaining how to design and implement web-based projects. Students were required to read the online articles, to preview the various websites, and to post comments in Townhall. For the synchronous aspects of the course, students were put into small groups (3 or 4 students to a group) and given several group assignments. They were required to use either NetMeeting or TappedIn to complete these assignments. In addition to reading about web-based projects, students were required to have their own pupils participate in a project and evaluate the results. These results were published in Townhall. Students were also required to create their own web-based project, thereby, creating a bridge between theory and practice.

One of the biggest complaints students have about web-based courses is they feel out of touch with their instructor. Since they would not see their instructor every week, it was important to provide the students with the opportunity to interact with the instructor on an individual basis. To accomplish this, the instructor set virtual office hours and posted times when she would be available to interact on NetMeeting and in TappedIn.

Students were also given the opportunity to provide anonymous feedback to the instructor about the course. Several questions were posted on the course website (http://classweb.gmu.edu/classweb/dsprague/). Students were able to respond to these questions and their answers were forwarded to the instructor's e-mail address (see http://www.response-o-matic.com for information on how to create such a survey for your website).

Feedback from Students

Townhall Postings

After an initial face-to-face meeting between the instructor and students, the course began with a series of web-based readings and students posting comments about the readings. It quickly became clear that several of the students were uncomfortable with this type of learning. Many students indicated that they did not like having to post their comments. They felt uncomfortable with having other people read what they wrote. They were concerned about spelling and grammar errors. In a web-based environment, students do not have the luxury of sitting back and allowing others to determine the direction of conversation, as they do in a face-to-face course. It is essential that all participate. For some students, this became a major obstacle that was impossible to overcome. For others, it was viewed as a challenge.

Several students also expressed uncertainty as to rather or not anyone was reading their comments. The students knew the instructors were reading the postings, as they frequently commented on them, but they were unsure as to rather or not their fellow students were reading the comments. Students were

reluctant to criticize others' comments because they had to see these same students face-to-face every week during their other courses (students were enrolled in two other courses during the semester).

Other students were unsure of how their classmates perceived them. One student who fell behind in the course due to connectivity problems was reluctant to post once the problem was solved. She felt that posting so late in the course would draw more attention to her than not posting at all. Instead of the cohort process allowing for a more open dialogue, it inhibited many students from participating fully and prevented an enriched discussion of the topics.

Other concerns centered around the impersonal nature of web-based learning. Students felt they were unable to express their feelings in the web-based environment as easily as they could in a face-to-face environment. In an effort to add their personalities to the postings, students began to experiment with the capabilities of the technology. Students began to add background color to their postings. This quickly led to adding graphics and animation. Other students began to write their postings in the form of poetry.

After four weeks of asynchronous learning, it became apparent that students needed an opportunity to explore a synchronous learning environment. The course was modified to allow students to engage in synchronous activities.

Reader's Theater

Students were put into small groups (3 or 4 students to a group) based on the grade level and content area they taught. They were asked to create a Reader's Theater on the pros and cons of web-based learning. A Reader's Theater is similar to a play in which each person has a role. However, unlike a play, a Reader's Theater is read with expression, but is not acted out. The students had experience in writing Reader's Theaters, so this was not a new concept for them. Students were encouraged to use TappedIn and/or NetMeeting to collaboratively write the Reader's Theater. They were asked to write the Reader's Theater in the discourse form of a talk show. One group modeled theirs after *The Jerry Springer Show,* while another group did theirs as a lunch room discussion among three teachers. The most creative one was written as a poem. The "participants" were Confucius, Shakespeare, and Dr. Suess. This group was able to capture the struggle students were having with the web-based course (Figure 1).

Figure 1: A Reader's Theater (written with permission from the students)

I am Deb, Deb-is-me
Do you like technology?
That Deb-is-me, that Deb-is-me
I do not like technology.
You can learn it on the web
I will teach you, I'm Dr. Deb.
I can not learn it through the Web
not even with you, Dr. Deb.
I'll send you articles, read them all,
then post your comments in Town Hall.
I never know what I should write
My spelling is an awful sight.
Review the web sites that I find
Tell me what is on your mind.
Sometimes I think it's nice to share
But do the others really care?
We can meet in virtual space
Come to my office to discuss your case.
I miss the contact, face-to-face,
I do not think I like this place.

Online Simulations

Each group was assigned an online simulation to explore and evaluate. Each member of the group spent time exploring the simulation. They were to evaluate the quality of the simulation and the advantages and disadvantages of having it available on the web. Common issues that emerged were the time it took to download the simulation, the lack of current information (a problem that occurred with one of the stock market simulations), and the need to coordinate completing the simulation (group project that required all participants to commit to a week of actually playing the simulation). Students were generally positive about the simulations and saw them as potential resources for use in their classrooms.

Once students had the opportunity to explore their assigned simulation, they met with the instructor in TappedIn to discuss their evaluation of the simulation before they posted it in Townhall. This gave students the chance to interact synchronously with the instructor. TappedIn is an electronic MOO, sponsored through a grant by the National Science Foundation (http://www.tappedin.org). Prior to meeting with the instructor, students were encouraged to sign-up as members (membership is free) and to participate in TappedIn's workshop for beginners. Students met with the instructor in her virtual office for one hour. Several of the students had attended the instructor's virtual office hours and were comfortable with using TappedIn. For other students this was a new experience for them and some were uncomfortable with the technology. The instructor eased their concerns by using many of TappedIn's commands to make them comfortable. The instructor passed around virtual candy and virtual wine. She sent them whispers and virtually grinned at comments. This led to questions about how to do these.

Before long, students were imitating the instructor. One student who had a difficult time understanding the concept of virtual candy and was uncomfortable in TappedIn was soon baking a virtual pizza and passing it around to others. These discussions resulted in students feeling less intimidated by the technology. Several students created their own virtual office and discussed using it with teachers in their schools to hold virtual meetings.

Using Web-Based Projects with Their Own Students

The students were required to have their pupils participate in a web-based project and then write a reflection on the experience. The purpose of this was to help the teachers take what they were learning in the course and apply it to their own practice. Many of the students were able to find appropriate projects and wrote that their pupils were excited about participating in these projects. They felt their pupils had learned from the experience. Throughout the course, as they reviewed other projects, they commented on the ones they would try with their pupils.

However, for other students, this assignment turned out to be difficult. Some of the students had taken a leave of absence from teaching in order to concentrate on the Master's Program. These students chose to have their own children participate in a web-based project or teamed with one of the other teachers in the cohort program in order to complete this assignment. Another problem that emerged was the lack of Internet access in the schools. Several students indicated they did not have access in their classrooms, only in the library. When they asked the librarian for permission to use the computers, they were told no. The librarian's response was that the computers were for research only, and if she allowed them to bring their students in to use the computers, then she would have to allow everyone to use them. The students worked around this problem by using their home access to complete the activities.

The remaining problem centered on the issue of not being able to locate an appropriate project for their content area. One student taught Algebra I and was unable to find any project that fit with her content area. Throughout the course, she expressed her frustration at the lack of web-based projects for Algebra. The instructor was able to locate one project, but when the student contacted the person running the project she discovered it was no longer active. This became a frequent complaint of the students. Many of the projects they wanted to participate in were no longer accepting registrations. As a result, they had to settle for less than ideal projects. This experience led to a good discussion about designing and implementing web-based projects. The final activity was for students to design their own web-based projects. At this time, students are working on their designs and have not yet posted them.

Face-to-Face Interaction

Students frequently complained about the lack of face-to-face interaction with the instructor. Although they saw each other once a week, they felt the need to also see the instructor. The instructor met with them the first night of class, but there had been no plans to meet again. It was felt that all interactions

could be handled virtually, through e-mail, virtual office hours, and in some cases, the use of a telephone. However, it soon became apparent that students still felt a need for face-to-face interactions. To accommodate the students, the instructor met with them again. At this meeting, the instructor went over the course requirements again and cleared up any confusion. In addition, time was spent on how to participate in an online course. The following website provided helpful tips for this discussion: http://illinois.online.uillinois.edu/model/Studentprofile.htm. Students seem to appreciate this effort on the part of the instructor.

Lessons Learned

Several lessons were learned from this course. First, although being part of a cohort provides support for teacher change (Norton and Sprague, 1996), it also can inhibit online conversations. Many of the students indicated that discussions about the web-based course and the material presented took place during the weekly face-to-face classes. For example, students had agreed to limit the amount of text on the postings in Townhall. To keep from being overwhelmed with reading each other's comments, students agreed to keep the limit to one screen of text. Decisions such as these were made during their face-to-face interactions in their other courses. The instructor of the web-based course was unaware of these decisions or of the conversations taking place outside of the virtual interactions. As a result, the web-based discussions were not as robust as they might have been if students did not have the opportunity for face-to-face interactions.

Second, web-based courses need a combination of asynchronous, synchronous, and face-to-face interaction. This course was designed with the majority of interaction being asynchronous. The instructors knew students were taking two other courses during this semester and knew the amount of workload involved. It was felt that requiring students to engage in synchronous interactions would be difficult for them. Several groups made comments about having to juggle schedules so they could meet synchronously. However, despite these concerns, there was a need to supplement the asynchronous interactions with small-group synchronous meetings in order to keep students engaged.

Third, face-to-face interaction needs to be a part of web-based courses. It is not enough for the instructor to be available virtually. Students need to see and hear the instructor in order to feel connected. Many of the confusions that were cleared up during the face-to-face class meeting had not been brought to the instructor's attention prior to the class meeting. It is unclear as to why students did not feel comfortable pointing out the confusions via computer-mediated communication. The web-based course met three times face-to-face during the semester. This seemed to not be often enough. It is recommended that a third of the time the course should meet face-to-face.

Fourth, students need the opportunity to provide anonymous feedback during the course. Although many of the survey comments submitted via the class website (http://classweb.gmu.edu/classweb/dsprague) were similar to the individually attributable comments posted in Townhall, some of the comments on the survey brought up new issues. Several students shared their enjoyment of the course and the content. Others used the survey as a chance to express their frustration about web-based courses. What was most interesting is that students were critical of the method of the course, not the content.

Fifth, web-based teaching and learning requires new skills than those used in traditional education. Students do not automatically know how to participate in a virtual course. Although the instructor warned students not to get behind in the course, several students soon fell behind. It was difficult for them to get caught up again. Providing students with information about interacting in a web-based course would be a good strategy to use at the beginning of the course. It should not be assumed that all students have the knowledge and skill to do well in a virtual learning situation.

Conclusions

As universities continue to move in the direction of on-line courses, attention needs to be spent on the design of these courses. On-line courses should consist of a balance between asynchronous, synchronous, and face-to-face interaction. What the balance would look like should depend on the nature of the students, the content, and the instructional goals. However, all three forms of interaction should be present in the course. Such interactions will enable the students to stay engaged with the material and

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enable the instructor to deal with confusion and problems that emerge. Time should be spent at the beginning of the course discussing web-based learning as a discourse form and helping students learn the skills they need to be successful in such a learning environment.

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A Framework for the Design of Web Based Courses

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Abstract: The world-wide web provides a convenient and inexpensive means of course delivery and institutions of higher education are rushing to put courses on the web. Once the decision has been made to develop a web-based course, the next important decision is the instructional design model to be used for the course delivery. There are many instructional design models which may be used with web courses including behaviorist, information processing, and social interaction models. One model which is well established and is suitable to web course design is the personalized system of instruction (PSI) model. The PSI approach is based on the elements of high student involvement in the learning process, immediate feedback, self pacing, mastery learning, proctoring, and careful planning and instructional design of course content. PSI is appropriate for courses in which the content is primarily cognitive information.

This article provides a review of the possibilities for using the web for course delivery and support and reviews techniques for the use of PSI for web course design. The basics of the PSI model are reviewed, a summary of research on PSI over the past 30 years is provided, and problems associated with PSI are discussed. Adaptations of PSI to make use of modern technology are included and a web-based course based on the PSI model is described.

The world-wide web provides a convenient and inexpensive means of course delivery and institutions of higher education are rushing to put courses on the web. However, instructors are typically provided with little or no training in producing a web course. Frequently, there is also inadequate time and financial support for instructional development of web-based courses. If training is provided, it typically deals with authoring software and technical matters rather than instructional design. This is a formula for producing mediocre courses. This article provides a review of the possibilities for using the web for course delivery and support and provides a description of the use of one well established instructional model, the Personalized System of Instruction (PSI), for web course design.

Use of the Web for Course Support and Delivery

The world-wide web can be used in many ways in courses ranging from the simple to the complex. The use of the web for courses can be divided into three categories: 1. Web supplemented, 2. Web dependent, and 3. Web based (King, 1998). In *web supplemented* courses, instructors typically begin by using the Web to supplement their regular courses by establishing a course web site on which to publish a course syllabus and provide links to sites related to the course content. As an instructor becomes more comfortable with using the web for course support, they may add a provision for students to submit assignments to the instructor through the web via e-mail or through using a fill-in-the-blanks form on the web site. Another popular feature of the web is on-line conferencing which allows students and the instructor to discuss issues outside of class. Class discussions may be conducted asynchronously through mailing lists or Internet news groups or synchronously (live) using chat programs. Courses in which the web becomes a major component or predominant component of the course are said to be *web dependent*. Web dependent courses may store lessons on the course web site for downloading, require that some assignments be sent to the instructor via e-mail, and require participation in on-line discussions. Sophisticated course web sites may also include live video conferencing and multimedia. In web dependent courses, face to face instruction may be less important than the on-line component. However, students are still expected to complete some course activities such as lab assignments, tests, and perhaps limited lectures and demonstrations in person on

campus. Totally *web-based* courses use the Internet almost exclusively for course delivery. Students may complete the entire course via the world-wide without coming to campus. All lessons, assignments, lecture materials, and instructions are located on a course web site, although students may still be expected to complete tests in person. When instructors decide to develop web course materials for the first time, it may be a good idea for them to start with the basics and gradually add more features to their course web site before attempting to develop sophisticated or totally self-contained web-based courses.

Design Options for Web Courses

The remainder of this article deals with courses which are totally web-based. The current inventory of web-based courses is almost as varied as are conventional college courses in their use of technology, sophistication of design, and depth of content. In 1996, the U.S. Department of Education reported an estimated 25,730 distance education courses with different catalog numbers were offered by higher education institutions (U.S. Dept. of Education, 1996) and he number of courses has increased dramatically since then. Once the decision has been made to develop a web-based course, the next important decision is the instructional design model to be used for the course. There are many instructional design models which may be used including behaviorist, information processing, and social interaction models. One model which is well established and is suitable to web course design is the personalized system of instruction (PSI) model. The PSI model is based on behaviorist and cognitive psychology and encourages mastery of course content. The PSI model is best suited for courses involving skills or cognitive information. For courses which require group interaction, student-determined goal setting, or provide for unique experiences for the student, the PSI model is probably not appropriate. The major elements of the PSI model are widely used in print-based distance education programs and also in large group campus-based courses. The experience which has been gained with PSI in these applications is relevant to web-based distance education.

Basics of The PSI Model

Innovations in education usually have short histories. PSI however, is an exception to the rule and has commanded attention for three decades. The PSI model was first introduced by Keller and Sherman during the 1960s as a form of programmed instruction that employed a highly structured, student-centered approach to course design (Hambleton and Foster, 1998). The distinguishing features of a course based upon the PSI approach to course design were as follows (Keller and Sherman, 1974):

1. students proceeded through the course at their own pace;
2. students were required to demonstrate mastery of each component of the course before proceeding to the next, although summative assessment was still provided by means of a final examination;
3. the teaching materials and other communications between teachers and students were largely text based;
4. 'proctors' provided tutorial support and assessed the achievement of students on individual components of the course; and
5. lectures and demonstrations were intended to motivate students rather than to deliver core course content.

In recent years, the PSI model has been modified to include modern technologies and to rely less on text materials.

Background on Applications of the PSI Model

The PSI model has been used with a wide variety of academic levels, institutions and disciplines. The most common level for use of PSI is the college level but PSI courses also exist in secondary schools and in adult and continuing education. The PSI model has been widely applied to university courses with large enrollments due to the well know limitations of large lecture-based courses as well as economic necessity (Calahan and Smith, 1990).

The PSI model seems to be followed closely in most print-based correspondence courses (Moore and Kearsley, 1996). This is true even though many course authors may not be deliberately implementing a PSI course. Correspondence courses are usually self-paced with a time limit for completion. Correspondence courses are

usually divided into a series of lessons or modules, each including a stated list of objectives, specific directions to the student, discussion material, and a test or other assignments which students must complete to indicate mastery. Students are also required to pass one or more supervised course examinations. Proctoring is usually handled by the course instructor who answers questions submitted by students in writing, grades lesson assignments, and provides feedback. There are no face to face lectures in correspondence courses but this element of the PSI model is provided for by means of the course guide where the instructor supplements the text and provides guidance for the learner. Student evaluation includes both evaluation and feedback throughout the course and a summative evaluation. Over the past decade, correspondence courses which are entirely print-based, have evolved into individual study courses which may include video or audio tapes, visuals, computer materials, and world-wide web sites as well as printed textbooks and study guides. Texas Tech University is the largest provider of individual study courses in the United States, with enrollments which exceeded 46,000 for 1996-97 for high school, college, and non-credit personal improvement courses (Texas Tech University, 1997). The major elements of the PSI model are included in almost all Tech's individual study courses. Tech's individual study courses which are available on the web can be accessed at: www.dce.ttu.edu.

Research on PSI

There is a substantial body of literature spanning a thirty year period that attests to the broad effectiveness of PSI courses in terms of both student mastery of course content and student course evaluations (Kulik, et. al, 1979; Jacobs, 1983; Kulik and Kulik, 1989; Gibbs, 1992), Hambleton and Foster, (1998). Certain common problems associated with PSI have also been documented. A review of both the successes and problems associated with PSI can aid the web course developer. Some of the most important generalizations of this research are as follows:

Mastery Orientation

Of all PSI features, the mastery orientation seems the most important for academic performance. Studies have shown that when the mastery-over-small-steps requirement is held constant, final exam performance remains constantly high even when mastery criterion is set at a high level (Hambleton, 1998). Not only do students in PSI classes make higher scores and grades than students in conventional classes, but they also retain the material better than do students in conventional settings (Callahan and Smith, 1990).

Self-Pacing

The intent of self-pacing is to assure that those who are better prepared are never held back and may complete course requirements early. Other students are able to proceed at a pace, which suits their abilities or personal schedule. Self-pacing does not seem to be critically related to academic performance (Jacobs, 1983). However, it is a factor in producing favorable student attitudes. Some students prefer the option to finish early while others take advantage of provisions to take breaks from study when personal, academic, or work schedules demand increased attention.

Modules

An instructional module, or lesson, should consist of three basic parts: the presentation of original material, assessment, and feedback/redemption (Jacobs, 1983). The organization and format of modules is important since this is usually the primary communication between the student and instructor. The procedures of a PSI course are frequently novel to the student and are sometimes complex. Students are likely to become confused and anxious unless special efforts are made to anticipate these conditions. Clear, precise, and well-organized modules are essential to a successful PSI course.

Lectures

Since the role of lectures in PSI courses is minimized in a PSI course, they are usually given infrequently and attendance is optional in some courses. Their main purpose is to motivate students and to develop rapport between instructors and students. In some PSI courses, lectures have been removed entirely without adverse effects. Since there are usually no lectures in web-based courses, guidance, motivation, and explanation of course content provided by the instructor through the course study guide becomes extremely important.

Proctors

The use of proctors and emphasis on personal interaction distinguishes PSI from most other forms of individualized instruction. In campus-based PSI courses, proctors make frequent testing and immediate feedback possible and are in the position to encourage and interact with students individually. Proctors also function as tutors by clarifying objectives and explaining difficult concepts. Research has shown that field independent students generally achieve better academic success in PSI courses but that the use of proctors contributes more to the success of field dependent students when proctoring is a major course component (Jacobs, 1983).

A Model for PSI Web Courses

A sample PSI-based web course is EDIT *5340 On-Line Communications and the Internet* offered by Texas Tech University. The course URL is: www.dce.ttu.edu/dl/courses/edit5340.

A web-based PSI course syllabus will look similar to that of a conventional course and will include a course description, course objectives, a list of texts and any other required materials, course procedures and policies, and a list of assignments and grading procedures. Since the course is self-paced, there will be no rigid course schedule although a series of deadlines may be included. It is important to include specific procedures describing how the course operates including how assignments are to be submitted, how tests are to be taken, and how the student may find help and have questions answered. A set of frequently asked questions is included on the course web site. Students may also submit questions to the instructor via e-mail or they may call a toll free number which is available to Texas Tech students.

EDIT 5340 is divided into a series of lessons consisting of the following sections: Introduction, Module Objectives, How to Proceed, Discussion, Self-Help Exercises, Lesson Assignments, and Review Questions. In this course, introductory material and the first lesson are printed in a course guide which is sent to each student upon enrollment. The remainder of the lessons are stored on the course web site where students my read, print, or download them to their own PC. The main components of each lesson are as follows:

Introduction

The introduction presents an overview of the lesson and is about a half page in length. It includes a statement of the importance of the lesson, a brief overview of the material and activities to be covered in the lesson, and sometimes thought provoking questions which are intended to focus the student's attention and provide motivation. For example, the introduction to the lesson on finding information on the world-wide web from EDIT 5340 states: "*The web now has more than 1 million pages on-line! So if you're looking for information, you need help. Otherwise, it's a little like looking for a needle in a haystack. In this lesson, we'll look at some of the best ways of finding information on the web...*"

Lesson Objectives

These are measurable statements of learning outcomes that clearly state what the student is expected to know or be able to do after completing the lesson. For our lesson on finding information on the web, a sample objective is: *After completing this lesson, you will be able to locate specific information on the web using two or more web search engines.* It is important that the list of objectives be comprehensive enough to include all expected learning outcomes for the lesson and they should be clearly and unambiguously stated.

How to Proceed

This section is a step-by-step listing of what the student is to do in order to complete the lesson. Here's an example from EDIT 5340:

1. Complete and submit Lessons 1 and 2 before proceeding with this lesson.
2. Read the lesson introduction and objectives.
3. Read Chapter 5 of the textbook and the discussion material included in this lesson. Pay careful attention to the terms introduced and the procedures for constructing an Internet search using boolean logic.
4. For your own information, complete the Self-Help exercises included in this lesson. These are not submitted with the lesson assignment.
5. Complete the Lesson Assignment, including the review questions and applications exercises, included in this lesson.
6. If you have questions about the lesson or assignment, you may send an e-mail message to me or submit it to the class listserv.
7. Submit your Lesson 3 assignment via e-mail as described in the *Procedures for Submitting Assignments* in the *Course Introduction*.
8. Proceed on to Lesson 4 when you are ready.

These instructions are intended to specify precisely what the student is expected to do and the order in which the steps are to be completed. The intent is to leave little room for possible misunderstandings.

Discussion

This section might be thought of as a substitute for the class lectures. The purpose here is to supplement the textbook, not to repeat it. Important concepts and principles can be pointed out and explained. Important information that is not included in the text can be added. Points that the student may find confusing can be explained and the importance and application of the lesson material can be stated in order to motivate the student. Clear and concise writing is important here to avoid misunderstandings.

Self-Help Exercises

These exercises are designed to provide practice and reinforcement for the student. These exercises are optional and are not submitted or graded. Such activities as answering review questions from a textbook, defining key terms, or accessing Internet web sites containing supplementary information may be included in Self-Help exercises.

Lesson Assignment

The lesson assignment may include any assignments which allow the student to demonstrate mastery of the lesson objectives. In EDIT 5340, the lesson assignment consists of a set of review questions and a set of application exercises. The review questions are a set of multiple choice questions, which are designed to measure the student's mastery of the lesson objectives. It is especially important that questions be worded well and that there be exactly one justifiably correct answer. Questions are designed to measure concept attainment and an ability to apply the information contained in the lesson. The applications assignments require the student to demonstrate the appropriate behaviors specified in the lesson objectives. In the web search lesson, one assignment is for the student to conduct an Internet search on a given topic using the *Yahoo* search engine. Specific instructions are given including diagrams, and computer screen, and examples as appropriate. The assignment section also specifies exactly what items the student is to submit to the instructor.

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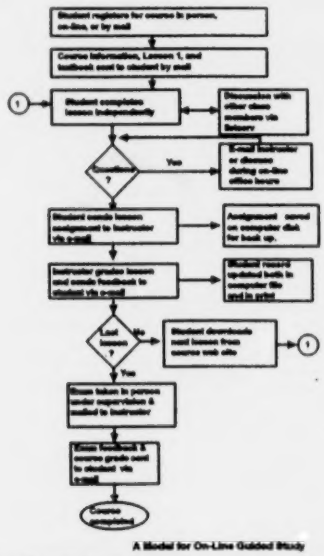
Course Operation and Practical Considerations

A description of the operation of the sample course described here is shown in Figure 1: A Model for Online Guided Study (Price, 1997).



A Model for On-Line Guided Study

Lessons are downloaded or printed by the student from the course web site. Course lessons are stored on the web where they can be printed or downloaded by students. Lessons are much easier for the instructor to update than are printed lessons. Assignments are submitted via e-mail. After grading, feedback on assignments is sent to the student via e-mail. Assignments are usually graded and returned within 2 working days.

A common complaint concerning individual study courses is the lack of interaction and personal contact with the instructor and other students. Many students attribute the feeling of isolation associated with individual study as one of the primary reasons for not completing courses. The Internet can help here by providing a means for the student to communicate with the instructor via e-mail. Also, a class listserv (an automated program which distributes e-mail) puts students in contact with one another. Students can send questions, suggestions, and ideas to the class via e-mail in this manner. Students also read the postings of other students and respond. The listserv also provides a means for the instructor to send announcements of general interest to the class.

The lack of access to library resources and information is another common problem associated with conventional individual study courses. Therefore, many Internet resources were incorporated into the course lessons. Students learn to find and retrieve information from a variety of sources such as Tech's on-line Library Information System and the world-wide web using their web browsers and other Internet tools such as FTP and Telnet.

Course exams are taken in person with a supervisor present. Exams are scheduled at a suitable location near where the student lives or works.

From the instructor's point of view, the lack of feedback from students about the course is another common problem associated with most individual study courses. Since the instructor and students may never meet, it is difficult to judge whether instructions and assignments are clear and whether course content meets student needs. However, with on-line guided study, the continuous communication via e-mail helps the instructor to realize when changes in the course are needed.

Conclusion

With proper planning and attention to instructional design, web-based courses can provide a convenient and instructionally sound method of course delivery. The PSI model is a proven model which can be applied to many web-based courses.

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Transforming the Graduate Learner from Traditional to Web-based Instruction: Integrating Internet Technologies to Enable the Paradigm Shift

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Abstract: With the primary goal to facilitate change and a paradigm shift in students' thinking about distance communication , a distance delivered course was taught in seminar format on information and communication technologies. By using traditional and methods to introduce the technologies and practices, the paradigm shift was enabled. Several strategies were employed to facilitate this change: namely, scheduling two face-to-face meetings, using an instructor team approach, empowering students to establish their own rules of "netequette," establishing controversial topics for debate, encouraging teamwork activities, promoting highly–creative web page development as term projects. The effort was successful as observed by students' interaction through their newly-learned computer technologies.

Introduction

Graduate students in education continue to request courses and degree programs delivered via some distance format. Most graduate students in the College of Education are full-time professionals who have difficulty participating in the traditional, face-to-face, evening or weekend extension courses that involve travel to a site. It is also more common to hear potential graduate students express inability to block out weeks of their summer time to attend on-campus courses. Therefore, more courses in graduate programs are requested as delivered via distance in some way. The recent growth of the Internet and the World Wide Web (WWW) has led many students to request distance delivery of courses via the Internet and WWW. The convenience of being able to take a graduate course from their home computer has intrigued many of our public school professionals.

However, historically, many learners are not prepared to make the paradigm shifts required to be a successful student in the virtual setting. And, in many cases, students find themselves dropping out or performing below their expectations. Often students are unable to make the change from the expectations associated with traditional face-to-face instruction to the demands of the virtual classroom. They find that the lack of the familiar face-to-face structure with more directed instruction is sorely missed, and the new arena of the self-motivated, self-directed learner is one for which they are not prepared. In addition, the technology expertise required for successful distance communication is insufficient, resulting in high levels of anxiety or frustration.

Background

Distance education is not new, starting with correspondence courses delivered by mail in this country being advertised in the 1700's (Willis, 1993). Electronic means of distance delivery in the U. S. did not begin to expand much until the 1980's. By 1989, the efforts to expand distance education by a variety of electronic media was widespread across the country (1989). What was considered as substandard practices just a few short years ago by many officials in higher education and implemented by only a few institutions, is now a very real solution for most all higher education institutions, not only in this country but also throughout the world as well (Keegan, 1986).

Because of the interactivity of the Web, the opportunity exists for designing a higher order of instruction instead of the programmed instruction or the simple correspondence approach. An increasing number of institutions are recognizing the variety of media supported by the Web and the availability of personal computers and are seriously making efforts to use this viable, dynamic medium for distance learning (Moore and Kearsley, 1996).

There is an array of software pre-designed for instruction on the Web. However, many are costly and cumbersome to use. Most Web-based commercial software frequently dictates instructional designs that do not provide sufficient opportunity to enable students to have a successful experience. The structure built in to most course software packages creates an intimidating and formidable atmosphere for the beginning distance learner. As an alternative, utilizing a variety of strategies including face-to-face instruction, email, Web conferencing, student empowerment for setting course structure and direction, web page resources, the Internet, and team teaching could create a paradigm shift that would facilitate a successful distance learning experience. After all, distance education is about change (Moore and Kearsley, 1996).

Procedure

In selecting and designing a distance-delivered course for the Web, we wanted to insure that students would have a highly positive experience. With this in mind, we established the following objectives to guide us in the selection of content, instruction design and delivery methods:

1. The course had to include debatable issues that held a common interest for students.
2. The course would be team-taught to add interest, broader perspectives, and more individualized attention.
3. The technology tools had to be relatively simple, easily available, flexible in structure, and low-cost.
4. Facilitating the paradigm shift was established as a major goal.

Strategies that Enabled the Paradigm Shift

Since the course was titled "Seminar: Information and Communication Technology", the goals of the course required that a major paradigm shift take place for

all learners to be successful. Most graduate seminars, when taught face-to-face, cause little challenge for teachers to become engaged in communicating their views. Our course, requiring use of the Internet, e-mail, "chatroom" software, and web development software created new challenges that required more enabling strategies. Almost all of the students enrolled in the class had limited or no experience with a distance delivered class using asynchronous conferencing, and some had very little experience with use of the Internet and email, complicating the issue even more. That, coupled with the fact that most of the students were non-traditional with high anxiety levels about success with the technology, presented learner requirements that we had to address. Also, another problem that didn't surface until the course began, were "netiquette" issues. Therefore, a major shift in students thinking about acquiring information and communicating in class sessions, had to be enabled in such a way that the technology would become transparent.

The first strategy was to establish some traditional structure that was familiar to the students. The traditional components selected were some face-to-face meetings and establishing scheduled dates and times for the on-line sessions. The first session of the class was scheduled as a face-to-face format to enable everyone to get acquainted and develop positive relationships with the instructors and each other. This meeting served the purpose of establishing a comfort level that prepared the students for the changes that followed. The regularly scheduled times for the on-line sessions provided the students with concrete events to motivate them to prepare and keep on-task during the course. It also provided times when they knew they would have the opportunity to interact with other and when they were assured someone would respond to their communication efforts.

One key component in this strategy was to schedule a face-to-face meeting at the beginning and near the end of the course. This event established a camaraderie that was maintained through the distance-delivered sessions that followed. At the face-to-face meetings, the technology tools were taught and practiced. The interactions that occurred, the visual images developed, and the confidence level established through practice among peers, set the stage for continued positive learning during the on-line sessions. The second session provided reinforcement for the new skills learned and strengthened the camaraderie among the students.

Strategy two was to begin practice with email, a technology with which everyone had at least some level of experience and expertise. The instructors sent emails to each student a minimum of once per week. Activities were also scheduled where students had to email with each other to finish the work. All assignments and notices about the next class were communicated by email with a web site as a backup where the same information could be retrieved. Even when telephone calls were received, the students were encouraged to check their email as well to answer the questions expressed in the calls.

To further strengthen the skills to communicate effectively by email, small group projects were assigned between sessions. Students, therefore, knew they had to communicate with each other several times, refining their skills of setting up address book lists, establishing files for saving information, and sending attachments or pasting information into email messages. They also sent all correspondence and web site contributions by email to the instructors. To reinforce this shift in communication, the instructors responded to email promptly, sometimes daily with certain students, to develop the habit.

Strategy three was to create and maintain a web site for the course. The intent was to encourage students to use the site for supplementary information. Ownership in the site was encouraged by posting contributions from students and giving credit for the

source. One part of the site was to create a set of links to URL's that the students found in their searches that benefited others. To "force" the paradigm shift from traditional instruction practice, no hard copy was mailed out to the class members after the first face-to-face class session. Midway through the course, the site became a source from which the students could navigate to other sources of information that were of interest. This particular strategy was most successful, established strong feelings of ownership, and led to the students requesting instruction in web page development which we substituted at the end of the course.

Strategy four arose out of necessity during the first session: the need to establish "netiquette" rules for communicating in "chatrooms". Through actual situations, we worked with the students to develop rules for courtesy that encouraged conversation electronically rather than discourage members to be silent. Also, rules were established to actively promote contributions from the "silent types" rather than ignore. We also encouraged the students themselves to police each other when members made mistakes rather than place the burden entirely on the instructors.

Strategy five was to select topics for discussion that involved common interests, yet at the same time promoted controversy. Challenging issues, for which no easy answers were apparent, were selected for total group and small group discussions. Since all members of the class were public school educators, the topics that fit these criteria were easy to select. These topics were sent out as emails to students to prepare for discussion for each scheduled on-line meeting. The web site was also used to communicate all meeting agenda, class assignments, and supplementary information.

Another feature that later identified itself as a key strategy was the team teaching approach. At the beginning, during the face-to-face session, we recognized the advantages of two perspectives, yet at the same time compatibility, enhancing the instruction of new technology and being able to respond to students' fears of the technology. While one instructor was directing the instruction, the other was facilitating the practice and application of the technology. Also, for that first face-to-face meeting, we met in a networked computer laboratory where the distance technologies could be simulated. This environment necessitated the team teaching approach.

Later, during the on-line conference sessions, we found it necessary for one instructor to focus on the technology difficulties that arose with certain students while the other led the discussion. On two or three occasions, when several problems arose with technology, we would assign one of the students to serve as leader of the discussion while both instructors aided students in troubleshooting particular problems. This particular strategy, although not planned initially, became one of the best enabling strategies to accomplish the paradigm shift we were hoping for. These experiences prepared the students to accept responsibility for their own learning, sharpen their problem-solving skills, accept leadership roles, and better appreciate the need for following "netiquette" rules.

The seventh strategy, one that had a powerful influence of the paradigm shift, was to empower the students to set some of their own rules, to be involved in choosing how they would learn, and to recommend and choose their major project for the course. A great deal of latitude was given to them in planning how they would format and submit assignments. Students were encouraged to collaborate in doing their work for the course. An outcome of this strategy is that students practiced their newly learned skills by working together in teams through distance technologies. All of them were highly motivated to develop their skills in developing web pages because of the interest in the Internet.

Distance technology tools used

The course is a graduate level, 3-credit class called "Seminar: Information and Communication Technology" offered in the Spring of 1999 through the College of Education at the University of Wyomng in Laramie Wyoming. The purpose of the course was to teach communications technology, comupter multitasking, web page design and development using issues in Vocational Education as the forum for discussion. The real uniqueness of the course from the student's perspective was that the software the student used in the class was dowloaded for free from the Internet.

The process that we used centered around a website we developed with Claris HomePage at http://ed.uwyo.edu/AgEd/edas5870/index.html. The site included the course syllabus, class schedule, assignments, materials for further reading and web links. The web conferencing software was a free download called ICQ at http://www.mirabilis.com . We also coached the students during the first face-to-face session to download and configure the software for their respective computers. This software enabled us to establish a separate forum for small group discussions as well as total group conference. We also helped students establish E-mail addresses by using MSN HotMail provided by Microsoft at http://lc2.law5.hotmail.passport.com/cgi-bin/login. With this tool we were able to send topics for discussion and reactions to individual student's work and questions. By asking the students to set up a separate email account, it was easier for them to manage mail that was solely for the purpose of the class (which served well for the instructors also).

The final piece of software we used towards the conclusion of the course was the 30 day trial version of Claris HomePage from http://www.claris.com/products/try_filemaker.html . This is a fully functional webpage development tool with a very easy learning curve. With this tool our students were able to develop instrutional websites which we later posted on our website. By meeting as a group initially and again toward the end of the course, we were able to help the students develop fairly advanced skills in using Internet, email, WWW, and working together in teams via distance technologies.

Results and Implications

The last face-to-face session represented examples that summarizes best how the strategies contributed to a paradigm shift that enabled distance communication and learning. At the request of the students, we prepared instructional exercises to download and work with trial versions of Claris Homepage. The students became so motivated by the prospect of designing web pages for their respective school use that everyone wanted to work either individually or in teams to create web pages as term projects. The location of the face-to-face meeting was in a computer laboratory facility with a server and access to the Internet. We quickly noticed that during the course, the students were still using electronic communication with each other as well as oral communication. At one point, three students were multi-tasking, creating different components, searching and downloading information, and assembling their final product in a common file on the server. In the weeks that followed, all of the communication between the students and instructors was by email. All but one student were able to attach and send their final project to us by email so that we could post their web page project on our web site.

Given that our most important objective was to facilitate a major paradigm shift held by the students about communicating with each other, this course was successful. An additional accomplishment was that the technologies used in the course were available as free trial downloads that the students could obtain on their home computers.

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An Examination of the Net Generation: Using Doctoral Students in Web Based Courses

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Abstract: This paper is designed to assist graduate level professors with On-line teaching and will describe the balance needed between effective teaching and learning practices. A participatory model will be presented which includes web-enhanced instructional strategies and delivery techniques that include multi-sensory approaches using the internet.

Introduction

It is a delicate balance between teacher content control and student's active participation in a learning environment in graduate level courses. For the past three years, at the University of Central Florida in Orlando, the doctoral level courses have been web-enhanced. Now some courses are totally on line. In this type teaching and learning environment instructional considerations have been renewed. The focus of this session will be to describe the changes that have occurred and how doctoral students have provided input into web enhanced instruction.

Computers alone won't do the trick. They are necessary but insufficient for moving our thinking into new heights of effectiveness. We still have to learn best how to use this technology. The students are the most powerful forces for change. Absorbing content knowledge was the old way of learning. Now, learning how to navigate and how to learn means learning how to synthesize, not just analyze. Engaging in information and communicating with fellow students on the net allows students to construct higher-level structures and mental images. The shift from teacher-centered to learner-centered education does not suggest that the teacher is suddenly playing a less important role. A teacher is crucial and valuable in the learner-centered environment. Because along with the learner, the teacher is now creating the structure of what is to happen in the course.

Campus Support

The Office of Course Development and Web Services was developed at the University of Central Florida in June of 1996. This office was formed following the appointment of a Provost for Information and Technology. The Office serves the following purpose:

- Helps faculty integrate technology and media to transform the learning process
- Produces multi-media courseware, software, and databases
- Produces learner support for succeeding in technology-mediated classes

The Office of Course Development and Web Services trains the faculty in the use of WebCT. WebCT (short for World Wide Web Course Tools) is a commercial tool used at UCF to facilitate the creation of entire on-line courses or to simply publish material to supplement existing courses. WebCT is completely web-based. There is no Software to install other than an Internet browser on the computer used by students and faculty.

The Web CT Academy is divided into six courses:

Freshmen Level

General overview from a student's views, including logging in, navigation, forum, chat, quizzes, calendar and checking grades.

Sophomore Level

The instructor's view of administration of a course, including forum creation and maintenance, student and grade management, student tracking, and help function.

Junior Level

Higher level of course administration, including overview to quizzes, reviewing And grading quizzes, course calendar and glossary.

Senior Level

How to design and develop and grade quizzes

Masters Level

Masters Level is for those instructors who wish to maintain their won courses on Web CT, including file management, path editor, and course design feature in Web CT.

Ph.D. Level

The Ph.D. level requires knowledge of HTML. In this class, the instructor will learn how to upload/download materials and graphics.

Without the support of the University's Office of Course Development and Web services the web-courses would not be a reality.

Teacher- Learner Collaboration

The initial discussion with the doctoral students about putting the course on line was accomplished through a "class meeting." Students like to know the latest advances and changes in the schools curriculum. Fortunately, when it was explained that the university was moving to web-enhanced and on-line courses in the doctoral program their

natural curiosity was aroused. The course syllabus information was posted on the web. Then, during the first class session, the students moved to the computer lab to see the page and to practice how to log on. The next step involved seeking their input. Without having the content knowledge of the course, we discussed a format design that would be consisted with each new topic to be learned. The focus of the course is on instruction. The course represents the instruction side of the curriculum and instruction doctoral program. The book selected for the course is Models of Teaching by Bruce Joyce and Marsha Weil.

The group through the class meeting agreed upon the format for the web page. Each student was assigned an instructional model that they would word-process and submit for course credit.

The format for each instructional model is as follows:

Learning Objectives
Purposes and Assumptions
Additional Resources
Additional Links

The learning objective section identifies the outcomes that will be reached by students as they browse through the web page. The purposes and assumption section of each model includes a description of the theorists associated with the model, a summary of the model parts, and the date the model was developed. The additional resource section of each model lists hard copies of related materials and the additional links section lists URL addresses the students might browse.

When students are allowed to generate their own goals in collaboration with their teacher they become motivated to learn. Goals are best when they are:

1) created by the learner
2) concrete and specific
3) due on a specific date
4) self-assessed often
5) re-adjusted periodically

Role as Catalyst, Not Teacher

The belief system that allows for collaboration with students and is indeed a new model for teaching is advocated by Eric Jensen in his book Super Teaching. The old model of teaching was: I *Teach, Students Perform, I Assess.* In today's model the focus is

different: *I'm a catalyst for Student Learning & Student Self-Assessment.* The negotiation process for course formats using the web is representative of this new thinking. As the teacher, you are willing to examine the integration of technology and you establish a positive learning environment that will maximize the student's potential for learning.

Web-Page Design Enhances the Learning

How much did you learn and retain from high school or college? Usually the answer is, "just enough to get my degree." Everything else you learned, you chose to because it was fun. Our brain is genetically programmed to learn the behaviors needed to be learned for your perceived survival. If we want to encourage and develop better thinking skills for students, then we need to focus on learning not, teaching or instruction. How does web-design assist with learning potential? There are several ways.

Prior exposure to information speeds up learning. The brain has a waiting room that stores information to be learned. If the information is not utilized over time, it lies unconnected and random. But if other parts of the puzzle are offered, the understanding and extraction of meaning is rapid. The access that students have to content offered through web-design exposes them early to the information. Pre-exposing learners weeks in advance will maximize their potential for encoding the skills to be learned.

Other means for pre-exposing learners include using web-design include:

- Course description posted on web in advance to the course
- Talking with past students from previous cohort groups
- Using colorful peripherals in the web-design
- Use of power point graphic pages

The use of pre-exposure with positive visual suggestions like color-coding key items facilitates greater recall and successful encoding.

Posted Focus Questions

Focus questions were used to stimulate discussion between students. Each instructional model that was assigned had a focus question. The student was then responsible for answering the focus question. In addition to the response to the question, the student was required to add new information to the page or respond to an another student's question or response. Suggested additions to the page included citing authors, journals, curriculum guides, or web-sites, or related URL addresses.

When students are learning from one another the learning environment is changed as represented in the following quote:

WE LEARN:

10% of what we read
20% of what we hear
30% of what we see
50% of what we both see and hear
70% of what is discussed with others
80% of what we experience personally
95% of what we teach to someone else

The students are responsible for presenting one of the instructional models as a formal presentation during our regularly scheduled class time. This means they must research the instructional model, prepare a power point summary of the model, and then teach the model to their classmates.

Continual Renewal of Web-Design

Each semester as the course is taught, a new group of students will add information to the web-page course design. The power point presentations will be added to enhance the visualization aspect of the design. The power point material will enhance the design, will help students encode visually, and will stimulate and motivate learners.

This paper has explained the role that doctoral Students played in web-course design at the University of Central Florida. The success of this endeavor is based upon the campus support that is provided as well as a philosophical position that allows students to focus on their own learning.

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The Internet Learning Forum: Designing and Building an Online Community of Practice

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Abstract: This paper reports an effort to create opportunities for teachers' professional development using the web and video technology. In view of the lack of critical reflective discussion among teachers in current teacher professional development programs, we address the problem of how developing Web and video technologies may be useful in providing innovative and effective professional development opportunities for pre-service and in-service teachers. Developed from situated cognition and community of practice perspectives, the Internet Learning Forum (ILF) is a new community model for professional development. Using the video demonstration as the anchoring point, participants engage in discussion that helps them examine their own assumptions about teaching and learning, reflect on their practices, and exchange information with other members in the community.

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Introduction

The difficulty of implementing change in education is well documented (Ball, 1996; Chism, 1985; Darling-Hammond, 1996; Willis, 1997). Traditionally, approaches to teacher development have assumed a stance toward teaching practice that concentrated on answers: conveying information, providing ideas, training in skills (Ball, 1996). Chism (1985) indicates that while the notions of peer interaction and support within the school and community of teachers are well understood, and indeed most teachers claim to practice them, ethnographic observation proves a significant lack of professional peer interaction among teachers in public schools. Consequently, a lack of critical reflective discussion among teachers exists, and generally, teachers find themselves developing their practice in isolation. Indeed, as Barab and Duffy (in press) contend, "learning should be viewed as a process of becoming a part of a greater whole" – in essence, learning is becoming part of a community of practice, not the acquisition of discrete pieces of knowledge. This philosophy is rarely applied in traditional professional development settings. This approach has implications for pre-service teacher education as well. Pre-service teachers' learning is traditionally conducted through textbooks and simulated teaching. Barab and Duffy (in press) emphasize that both pre-service and in-service teacher development needs to dramatically increase the emphasis on learning situated in real, not realistic, teaching practice and environments. However, there is a shortage of ongoing support for change-support that is situated in and addresses the specific pedagogical needs of the teachers (Smilie & Conners, 1991).

This work is grounded in Lave and Wenger's (1991) observations of learning in everyday life and apprenticeship situations and is consistent with assumptions underlying situated cognition. They emphasize engaging in real-world practices for the purpose that students can get the intact, spontaneous, sometimes hidden, wisdom from experts and practitioners, just as apprentices do with their mentors. Brown, Collins, and Duguid (1989) also maintain that everyday activities situated in the cultures in which people work allow students to develop matured proficiency through observing how experts engage in intuitive reasoning, resolving issues, problem solving and meaning negotiating. Many times problems arise out of the context and are resolved within the constraints of the activities. Thus, being deprived of the opportunity of interacting with real professionals in an authentic context and activity, students are likely to engage in what Brown, et. al called, "ersatz activities" and consequently develop incomplete conceptions of the practice and the domain. As such, some educators are creating opportunities for pre-service and in-service teachers to situate their learning in real-world practices are very important. A concept that can guide the design of teacher professional development programs, according to some situated cognition theorists, is "community of practice." A community of practice is formed by students as well as professionals, and is a community in which students have the opportunity to participate in real-world practices while working with experts and professionals as, what Lave and Wenger call, "legitimate peripheral participants" (Lave & Wenger, 1991). Indeed, research in professional development indicates that the most effective professional development occurs when formal instruction is supported by informal community structures (Lagache, 1993; Seely-Brown, 1998). Therefore, it is important for both in-service and pre-service teachers to learn through their membership in a community of practice.

The idea of situating teacher professional development in real-world context and community of practice can be accomplished through the technological innovations on the Internet. New technologies offer the opportunity for people to connect in ways previously unavailable to them. Particularly, we see great potential in assisting the formation of a community of practice by teachers from different contexts, which can then benefit teachers in their professional development.

Internet-based Professional Development

Reynolds, Treahy, Chao, and Barab (in review) maintain that four models exist for teacher professional development on the Internet, each with its own as strengths and weaknesses. The first model is *skilled based training*, which refers to those web sties that provide sequenced lessons as in a workshop, a job-aid or a collection of classroom resources. A general characteristic of this model is that they answer specific questions that a teacher may have, but they do not encourage discussion, collaboration, and reflection among teachers. The second model, according to Reynolds et al., is the *student inquiry projects* model, which refers to large-scale inquiry projects that teachers and their students participate. Learning opportunities are created for participating teachers as well because of the need for teachers to work closely together in making project decisions, solving problems, and negotiating for the details of the project. These rich learning, interaction, and reflection opportunities are congruent with many professional development standards for teachers. However, Reynolds et al. notes that this model can only work with in-service teachers, because most projects require that the teacher brings his own students, which is not possible with most pre-service teachers. The third model is the *spontaneous participation* model which allows teachers to participate at any time. Users have the choice of following the discussion closely or can participate only when they feel the need to. The strength of this model is its flexibility. A teacher can participate any time that he wants to, either as an individual or with a group. A potential weakness of this model is that when commitment is lacking the learning may become impoverished. In addition, a short online meeting may not allow participants to fully discuss an issue. Participants also may not access the site at the right time for the needed discussion. Reynolds et al. notes that commitment might be enhanced when the user can rely on the quality of information offered by the site. This model suggests to us that it is plausible to keep the participation structure flexible and inviting for groups as well as individuals. However, a more critical problem is how to build commitment and ownership in the community. The last Internet-based, teacher professional development model is the *distance education course*. With Internet courses, teachers can now attend the class any time that is convenient to them. The distance nature of the course also brings together participants with much more varied backgrounds than conventional classroom courses. However, given the large number of courses being offered by different universities, colleges, and private organizations from all over the world, it becomes quite a challenge finding reliable and quality online courses or programs.

Clearly, new models for professional development are needed, models that: (a) foster a culture of sharing, and (b) provide sustained support for teachers (i.e., knowledge networks) as they evaluate both their beliefs and practices. The project we describe here is the development of a virtual community prototype called the Internet Learning Forum (ILF) that is designed to support professional development of pre-service and in-service teachers through the networking of knowledge and use of electronic technologies. The design of this virtual community prototype on the web was directly impacted by the research on situated learning, community building structures, current virtual models for professional development and factors affecting professional development such as standards and credentialing requirements.

Project Context

The necessities for professional development in much of the American educational system are currently defined by professional standards and guidelines. In 1994, the state of Indiana adopted the Interstate New Teacher Assessment and Support Consortium (INTASC) performance-based standards model for assessing teacher preparation and licensing of education professionals. INTASC is a program to enhance collaboration among states interested in rethinking teacher assessment for initial licensing as well as for preparation and induction into the education profession. The INTASC Standards are performance-based with the focus on what the teacher will be able to do rather than on the number of courses and credit hours completed. In addition, professional development and licensing are based on learning outcomes and actual demonstration of understanding and application.

These standards cover a broad spectrum of professional development that range from asking teachers to be reflective to encouraging collaboration with colleagues and other professionals in the field. For example, standard nine of the Professional Standards for the Mathematics Specialist Credential states, "teachers of

mathematics are reflective practitioners who continually evaluate the effects of their choices and actions on others (students parents, families, and other professionals in the learning community) and who actively seek out opportunities to grow professionally" (1996, p. 12). Under this standard, teachers are asked to "advocate and model improved practices for the teaching of mathematics among colleagues through professional development opportunities, post-graduate course work, and the sharing of professional resources" and "draw upon professional literature, colleagues, and learned societies as supports for reflection, problem solving, new ideas, sharing experiences, and participating in workshops and courses related to mathematics" (1996, p.12).

Teachers are also asked to "foster relationships with school colleagues, parents, families, and agencies in the larger community to support student learning and well-being" and "plan instruction based upon knowledge of subject matter, students, the community, and curriculum goals" (1996, p.13). In addition, they are required to be current in their reading of professional documents and "align with curriculum standards, goals, and essential skills as outlined in the Indiana Department of Education Mathematics Proficiency Guide, National Council of Teachers of Mathematics Curriculum and Evaluation Standards of School Mathematics, Professional Standards for Teaching Mathematics, and Assessment Standards for School Mathematics" (1996, p.10).

The current demands for professional growth and standard-based credentialing requirements in Indiana and nationwide create pressing needs to evaluate the present situation in professional development programs and examine whether the existing programs are able to meet these needs.

The Project

The Internet Learning Forum is a research project in the first year of a three-year grant from the National Science Foundation (Barab, Moore, Duffy, & Cunningham, in preparation). This first iteration of the ILF focuses on Indiana math and science teachers of grades 6-12. The research agenda reflects the interdisciplinary aspect of the project, converging at the intersection of pedagogy, technology, social informatics, and learning theory. An interdisciplinary approach, reflecting this intersection, characterizes the research carried out to address the following research questions:

1. How can networking and electronic technologies be used to represent and facilitate the sharing and evolution of teaching practices?
2. What are the taken-as-shared meanings that emerge in the ILF communities and how do those meanings evolve and diffuse into classroom practices?
3. How do the ILF members structure themselves into communities and how do we promote boundary crossing?

As this project is only in the first year, this paper will focus on the design and early implementation of the ILF based on the theoretical foundations of building a community of practice. Three design principles guide the development of the ILF:

1. Visiting the Classroom -- An important aspect of becoming a community member is being able to share practice and see what other teachers are doing. Since live visits to classrooms are often impractical, the web (via video streaming and conferencing) offers a unique opportunity to not only visit a variety of teachers at times that are convenient for the teacher, but to engage in professional dialogue with other colleagues.
2. Foster Ownership and Participation -- In order to be an effective professional development system, participants must have a high degree of ownership and participation in the ILF. In effect, the ILF serves as a knowledge network for participants allowing them to build the community to best suit their needs.
3. Focus on Inquiry -- Our goal is to foster inquiry, both an inquiry pedagogy for the classroom and teacher inquiry into his or her practices. The focus of the ILF classrooms will be on sharing inquiry based learning environments. Teachers using the ILF will be engaged in a reflective process and one of our goals is to make that process explicit.

The Design

The ILF consists of a variety of participant structures, all related to virtually visiting the classroom of other teachers. A prototype of the system was developed in the Spring of 1999 to provide a proof of concept. A capture of the prototype home screen can be seen in Figure 1.

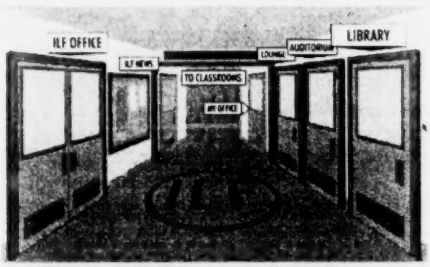

Figure 1: ILF Prototype Entry Screen

Upon entering the ILF the user is taken into a virtual school building - an environment that is familiar and inviting. From this entry page, several doors and hallways are featured. TO CLASSROOMS is the most prominently featured and entering this hallway takes the user to a listing (as well as search and browse functions) of math and science classrooms they can visit. In addition to the TO CLASSROOMS space, there are also four other virtual spaces designed to support professional development needs. The ILF OFFICE is the place where new participants can secure a password (the site will be password protected) and all participants can get help with technology, or with the use of the ILF or they can make suggestions. The LOUNGE is where teachers can participate in or establish either synchronous (chat) or asynchronous (web-based conferencing) dialogues with other teachers on a variety of pedagogical and practical teaching issues. The AUDITORIUM is the place where special events can occur. Generally, these involve the use of asynchronous discussions with plans to include a white board and reference resources. It also provides the opportunity for video-casting live or canned presentations for discussion. Any member of the community can hold a workshop, experts can be brought in, or, there may be synchronous discussion of specific issue. The LIBRARY is a place where teachers can go to access reference materials of interest, including references on teaching resource materials (software, other classroom artifacts like the graphing calculator, manipulatives, sensory probes), state and national standards, grants, applied research and theory, relevant state initiatives, and other materials the teachers identify as relevant. Additionally, users have a personal space, MY OFFICE, in which she can store bookmarks to resources and classrooms that are of personal relevance and return to those at a later visit. When a teacher enters the TO CLASSROOMS hallway, the list of classrooms to visit (with grade, topic, etc) will be available along with a brief summary. The nature of this space will evolve as the number of videos grows. Once a classroom is chosen, the teacher will enter an area like that shown in Figure 2. It is this classroom space that is the heart of what we are trying to achieve with the Internet Learning Forum.

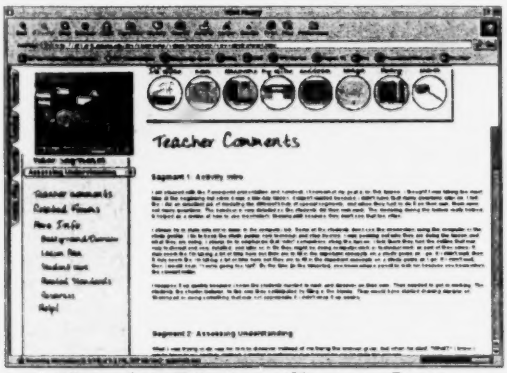

Figure 2: ILF Prototype Classroom Screen

The video of the class is the focal point. Additionally, there is commentary by the teacher in the video classroom on the context of the video as well as what is important to observe. Discussion forums are attached each lesson where teachers can discuss the use of the material and extending the instruction. The goal is for this discussion to help build a web of learning, extending the inquiry in the topic/lesson being observed to related inquiries that build understanding. Other resources provided include lesson plans, links to related standards

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documents (both content and practice standards), resources, and student work. Finally, there are links to related classrooms – videos of teachers who tried the lesson or who have related lessons.

Implementation

Currently, the website is being seeded with teachers who have been recommended as good models of student-centered teaching. Teachers are videotaped then reflect on their practice as they watch the video. Several segments, which highlight the arc of the lesson and showcase various teaching strategies and/or reflections are chosen. Additionally, teachers share lesson plans, student work, and are asked to help make connections between the lesson and both state and national standards. Initially, the ILF team is acting as a production team in the filming and editing of the videos. Eventually, we anticipate teachers will produce and organize their own videotaping, content selection, and commentary/reflection with only guidance from the ILF team. The first several "seed" teachers will serve as a model for what other teachers will do on their own later.

Additionally, the design of the site is undergoing multiple stages of user-testing which focuses not just on usability issues, but issues regarding community-building as well – bringing to the forefront issues of gatekeeping, ownership, and content integrity. Two advisory boards are working in partnership with us on the ILF. The Participant Advisory Board consists of eight classroom teachers who are providing initial, seed content for the website, as well as being involved in the design and testing process. The Research Advisory Board is made up leading researchers around the country and is serving to advise and guide the research agenda of the project. Also, a review panel reviews each lesson to ensure that the lessons being submitted to the ILF is conceptually correct.

Conclusion

While still in its infancy, the Internet Learning Forum seeks to research and development systems of support for building a community of teachers. Its design builds (and continues to evolve) from a situated cognition perspective that suggests that teachers will learn best when learning in authentic contexts and in collaboration with others. Although this model is specifically designed for pre- and in-service teachers in Indiana, it has implications for professional development more generally. Based upon the design principles stated above, the ILF will be a resource for math and science teachers where continuing professional development becomes an integral and essential component of their identity as teachers, where the culture of sharing among fellow practitioners, and nurturing of newcomers is as natural as planning a lesson and marking an assignment.

Teachers sharing and learning online - an innovative professional development model

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Abstract: "MSTelementoring" is an innovative, online professional development project for K-12 teachers in central New York State. The focus of the project is on changing teacher practice to more inquiry methods in math and science and technology. Teachers from both rural and urban districts support each other's learning as a sustained community meeting first in a face to face summer workshop then moving online during the year to reach each other in the context of their daily practice. Using a Web-based telementoring tool and threaded discussion educators, mathematicians, scientists, and K-12 teachers correspond with one another exchanging reflections, identify areas of difficulty, and get support from each other over the year which intimately connects their learning to what is going on in their classroom. This has proved particularly important for teachers isolated in rural districts and for those with limited resources from inner city schools.

Introduction

For teachers to create a shared vision of teaching and learning as outlined in the national math and science standards, they must be able to reach one another in the context of their work, as they use materials, guide students, and assess work in their daily practice[1] (Loucks-Horsley, 1997)

"MSTelementoring" is an innovative, online professional development model for K-12 teachers in central New York State's Syracuse and Onondaga-Cortland-Madison Board of Cooperative Educational Services region. It provides sustained assistance, focuses on changing teacher practice to more inquiry methods in math and science, provides an online telementoring group for sharing and learning, and supports teachers in their daily practice. Online communications plays an essential role in this project. A Web-based telementoring tool, threaded discussions, and a Web-based "Exchange" (http://www.ocmboces.org/iss/mstsite) link educators, mathematicians, scientists, and K-12 teachers, to form an online learning community where participants are in touch with one another, identify areas of difficulty, and get support from each other over the year. Adding the online component allows teachers to participate in professional development over an extended period of time and to intimately connect their learning to what is going on in their classroom. This has proved particularly important for teachers isolated in rural districts and for those with limited resources from inner city schools.

Goals

The MSTelementoring model aims to: 1) broaden and deepen teacher's knowledge of inquiry-based mathematics and science 2) help teachers understand the components of good student work and the ways in which students learn mathematics and science concepts, 3) help teachers recognize and analyze effective instructional strategies, 4) build collaborative teams of MST teachers, 5) help teachers use telecommunications technology, and 6) develop a sustainable professional development model that helps teachers become experts and see themselves as professionals.

Activities

Activities in this project are structured around collaborative work teams. Teachers participate in summer institutes where they are immersed in inquiry experiences through many mediums: hands –on experiential problem solving, viewing and discussing videos of classroom practices, getting acquainted and becoming familiar with the structured telementoring environment called MentorCenter which they will use over the year. Over the course of the year, participants work on MentorCenter assignments to get acquainted with each other, and to reflect on their experiences in their own classrooms.

Online Professional Community

A major goal of this project is to develop online professional communities of teachers as a way to engender ongoing teacher learning. The importance of professional community in the lives of teachers has become a necessity in an environment of change - curriculum reform, standards, and technology innovations. Using online communications during the Summer Institute and afterwards, we develop a community of learners around discussions of shared practice and reflection. We primarily use the two online environments, 1) Web-based telementoring tool, Mentor Center, with structured tasks that are created by project researchers and 2) an informal threaded discussion where everyone can initiate a topic or respond. In both environments we have participants exchange math and science curriculum, accounts of their practice, reflections on their growth, and requests for support. They also respond to colleagues requests and provide feedback to enhance the quality of their mutual learning.

Project elements

1. MentorCenter Assignments:

The sharing online covers a wide-range of content, perspectives, and self-reflection. Over time we have also seen changes in individual's engagement and commitment to their team and to the project.

Examples:

Below is an example of a supportive exchange between two high school chemistry teachers. They are discussing the value of the online community and communication with colleagues as a way to sustain their own growth.

> **HS Teacher #1** - "Collaborations with colleagues is a primal resource. Colleagues within my own building, within the MSTelementoring group as well as within the state...Ideas generated by others augment those of my own. Feedback on activities both mine and others, provide a platform for personal growth. The impact on the learning of my students will be a function of my movement closer to the Inquiry Approach whenever possible."
>
> **HS Teacher #2** - "I too think Telementoring has been a good tool for communication and learning. Mainly because of MSTelementoring I have probably communicated with you more both on and off line this year than I have in any two or three years combined."

2. Internet Curriculum Assignment:

Teachers are asked to take their ideas about inquiry and add the potential of the Internet in the form of research, communication, and/or publication and apply it to areas of interest in their curriculum. Below are several examples as described the teachers themselves of their project plans

***Example #1**: Community through global migration and seasonal change.*

Our third grade curriculum for social studies revolves around the concept of community. We study world communities, comparing and contrasting them with our own, looking at what makes a community unique, what influences the people and their lives, etc. In science we learn about life in plant and animal communities. Throughout the year we learn about how climate and landforms affect life in a community. The Journey North, an Internet-based learning adventure, engages students in a global study of wildlife migration and seasonal change. With global classmates, they predict the arrival of spring from half a world away. Students have available to them up-to-the-minute news from around the world, and they are able to report observations from our own hometown. The Journey North seems to be a very powerful vehicle for engaging students in real and relevant data collection with respect to community. To be able to track a particular animal, the emergence of spring tulips, the break-up of ice, provides a meaningful context in which to talk about/teach about/explore about life in a community.

***Example #2**: Course 2 Internet Relay Project*

High School students from four districts work on different aspects of interrelated Math problems. Partial solutions will be e-mailed to the next group of students. These solutions will be evaluated by the receiving students and used as input for their part of the problem. As they finish, they will e-mail their work and results to the next group, and so forth. The "last" group will finish the problem and verify their work and solution with the first group. Once completed and verified, certain problems may generate a follow-up set of questions pertaining to the finished product. These questions will be addressed by each of the groups of students and will be e-mailed to each other for discussion and verification.

3. Threaded discussion

The threaded discussion provides a more informal environment for project-wide discussion. It lends itself to sharing and learning on more immediate issues in the classroom and with students - ideas about content, dealing with classroom dynamics, sharing interesting resources, issues about school environment.

Below is part of an exchange where one teacher asks advice on how to get his students to participate in class discussion, and another is responding from her own experience.

> **Teacher # 1** (8th grade math teacher) asked - "It seems for some reason this year's group of students is lacking in the participation category. When I can get the students to ask questions they seem to understand how to ask and talk to each other, but I am having the hardest time engaging them. I will take any suggestions on this topic."
>
> **Teacher #2** (2&3rd grade special ed teacher) added -..".I present the question and let pairs or groups discuss it. Then we share with the group and try to see how many ideas we can generate. When an idea is presented that isn't "quite right" I try to capitalize on what is right and then ask the class if they could add more to the idea. That way the group giving that answer feels validated for what they did offer and yet learn how they might be able to improve on their idea next time. I am not sure of the success of this at your level, but this seems to help build confidence to be freer to give their solutions for my level."

Key Issues

Different participants have expressed difficulties in finding the *time* to spend on project tasks, having ready *access to the Internet* either from a computer at school or at home, and obtaining *administrator's support*. Although the project requests that administrators give their participating teachers 4 hours of release time

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during the week, just a few provide this option. Some of the creative administrators have assisted teachers by removing duties to "free" up time and encourage the use of prep time. One school provided a stipend for a teacher's working after hours; another provided a substitute which one teacher used in the morning and another teacher in the afternoon.

But with all the distractions and the pace of the school day, teachers have told us that they work at home at night or on weekends. Some teachers have found the opportunity to earn graduate credits an incentive to work on their own time. To support them, we have a partnership with a higher education institute, SUNY/Cortland, to provide 6 graduate credits for a small fee. Approximately one fourth of our teachers have registered. The online discussions have provided an avenue for teachers to share not only their problems obtaining administrators support but also their different solutions.

All participants were promised by their administrators to have or obtain by the fall access to the Internet from school. This also has proved difficult as we have found teachers who have computers in the classroom but no Internet access. In this case a visit from project staff raised the awareness with administrators and the Internet provider and within several weeks the teachers were connected. We are finding that when there is an Internet access problem we must address each participant's technology needs individually.

We are also trying to influence administrators by bringing them more into the project. We have run an administrators' session in the summer and are beginning to design an ongoing online model to work with administrators over the year.

Closing

We are now in our second year of the program and have found the interest in the online professional development model steadily growing. Many teachers coming into the project understand the need to be in continual communication with an online professional community of colleagues. Many administrators are beginning to understand that the changes demanded by curriculum reform require some way for teachers to have ongoing professional development and support.

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Incorporating Standards in Web-based Classroom Instruction

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Abstract: This paper considers the advantages of incorporating learning standards into web-based classroom instruction. State education departments throughout the nation are vigorously promulgating new and more stringent learning standards and their accompanying assessments to stem the tide of unsatisfactory student performance. The Internet is a powerful and attractive learning tool that has the potential to motivate even the most reluctant student. This paper will illustrate how a specific instructional tool, a WebQuest, can effectively deliver standards-based instruction. Examples of outstanding WebQuests are described in detail.

National Standards

The current emphasis on standards-based education began in 1983 with the publication by the National Commission on Excellence of its landmark document, "A Nation at Risk." This report heightened the awareness of the education community to the weaknesses in the American school system and ignited a national debate on ways to rectify the problems highlighted in the report. Subsequent education summits in 1987 and 1996 led many states to establish content area standards (Marzano, 1998). The Clinton administration responded by enacting the Goals 2000: Educate America Act in 1994 which seeks to produce national educational reform by supporting states' efforts to improve student performance (Stedman, 1993). The Act emphasizes educational goals, standards, and assessments as essential elements that must be addressed to improve the state of education in the country (*Goals 2000:* Reforming Education To Improve Student Achievement, 1998). Portions of the Goals 2000 funds made available to states are allocated to an aggressive grants program. Monies from these grants are targeted to promote systemic educational improvements at local levels through programs that address standards-based instruction and assessments, with particular emphasis on technology and collaboration with colleges and universities (*Goals 2000:* A Progress Report, 1995).

Recent reports have indicated that although improvements have occurred, as a nation we could be defined as "still at risk." American students continue to fall short in critical areas such as mathematics and science when compared to their counterparts in other industrialized nations (A *Nation* "Still" at *Risk.* An Education Manifesto, 1998). Research suggests that school principals throughout the country have made little progress in advancing the use of technology and have failed to relate technology to the National Education Goals articulated in the Goals 2000 legislation (Lunenberg and Irby, 1998).

New York State Standards

Encouraged by educators throughout the nation, today 49 states are currently promulgating rigorous learning standards for K-12 education. New York State's standards are broad statements that define specific competencies and serve as guides for curriculum revision, instructional practices, and assessment instruments. Standards are defined for the following content areas: English Language Arts; Languages Other than English; The Arts; Social Studies; Mathematics, Science and Technology; Career Development and Occupational Studies; and Health, Physical Education and Home Economics. The State distinguishes between a *content standard* that addresses knowledge and skills in content areas and a *performance standard* that indicates how students demonstrate knowledge and skills. These standards are articulated at the elementary, intermediate, and commencement levels. For example, a content standard of the Mathematics, Science and Technology Standard #2 on Information Systems is as follows. "Students will access, generate, process, and transfer information using appropriate technologies." A corresponding performance standard at the elementary level is: "Use newspaper or magazine index in a library to find information on a particular subject." An intermediate-level performance standard is: "Compose letters on a word processor and send them to representatives of industry, government agencies or museums seeking information on a student project." A commencement-level performance standard is: "Join a Listserve and send electronic mail to other persons sharing mutual concerns and interests." These standards seek to improve student achievement from the basics of mastering factual material to acquiring higher order skills such as the ability to solve problems, access and integrate information, apply knowledge to known and novel situations, read and write across the curriculum, become technologically literate, and work cooperatively and independently.

The New York State Assessment System is just as critical as the new learning standards. This system has been designed to replace the existing assessments and to align with the new learning standards. The new assessments must be performance-based, but they can take various formats. They can consist of traditional sit-down, timed tests that have been the staple of prior assessments, or they can take the form of journals or student portfolios. The first assessment was administered in English Language Arts to fourth graders throughout the state in January 1999. A series of assessments in various content areas and grade levels will be phased in over a number of years. The results of the fourth grade test were mixed, with low scores reported in many districts, notable several schools in New York City.

The State has moved to hold districts accountable for meeting standards and New York City Commissioner of Education Rudy Crew has taken these directives seriously. Several district leaders have lost their jobs based on their students' poor performance. Thousands of public school students were forced to attend summer school and to pass tests before being promoted. It is evident that these problems must be addressed through a collaborative effort on the part of teachers, parents, administrators, and teacher preparation programs (Sewall, 1994). It is equally evident that a promising solution path lies in the development of standards-based instructional models in content areas that can creatively and effectively enhance high order thinking skills in our students.

The Internet in Education

The challenge of creating these models within the curriculum content in the elementary and secondary school classroom is a formidable one for many of today's teachers. Many educators have discovered that the power of technology can be one promising means for meeting this challenge. Most schools in the US now have the technology to connect to the World Wide Web as part of regular instruction. According to *Technology Counts '99*, the annual report on educational technology conducted by *Education Week*, more than half of US schools are connected to the Web, and there is one computer for every 5.7 students (Fatemi, 1999). The Web can be a natural vehicle for delivering standards-based instruction to students. Most students are excited about the Internet and are comfortable using it. As such, activities that integrate the use of the Internet are highly motivating for students. Mastering computer technology, including appropriate use of the Internet, is itself one of the required learning standards. Because it provides such a wealth of material in other content areas as well, the Web is a rich resource that teachers can exploit to structure instruction in all curriculum areas.

WebQuests

The WebQuest concept was created in 1995 by Bernie Dodge at San Diego State University. An essential element of a WebQuest is that it provide an inquiry-based activity, using Internet resources (Dodge, 1995). Typically, students begin by reading the WebQuest page, where they are assigned a task that they must complete in several steps. The WebQuest contains links to sites that contain relevant information, often primary sources, that they need to use to complete the project. Because the links provide structure, students are not merely surfing in an unsupervised fashion but rather are visiting sites the teacher has chosen. This screening of sites both ensures that the material is valuable and addresses concerns that educators and parents may have about appropriateness of content. The task is usually a group project, requiring students to use higher order thinking skills such as role playing and problem solving to create a product which may be a multimedia presentation, a brochure, or a performance for parents or classmates.

Iona College Summer Institute

Recognizing that teacher preparation programs must assume an active role in preparing teachers to successfully address the issues of integrating standards and technology into the classroom, Iona College conducted a Summer Institute in Educational Technology with the theme, "Using WebQuests as a Tool for Standards-Based Instruction." This institute was funded in part by a grant through the Goals 2000 program mentioned earlier. The purpose of the Institute was to use technology to meet new standards through development of WebQuests. Participants studied existing WebQuests and evaluated them using a standard instrument. They received instruction in using Netscape Composer as an authoring tool. Keynote speakers discussed topics such as educational theory and standards. Brochures containing the new New York State learning standards in all content areas and grade levels were made available to all participants. In turn, students were required to include a statement of which learning standards were being addressed by their projects. Assessment is an essential part of the new learning standards, and state-wide grading is accomplished by using rubrics which describe characteristics of various levels of achievement. Institute participants were also required to create grading rubrics as part of their WebQuests.

The participants in the Summer Institute produced a number of outstanding WebQuests, all of which can be seen at the course website, www.iona.edu/cs/SummerInstitute/WebQuests.htm . The grad levels spanned from second to twelfth grades, and subject areas included Social Studies, Chemistry, English and Language Arts, Mathematics, and others. Following are overviews of a few of the projects.

"Celebrating Hispanic Heritage" is a WebQuest whose theme is "Proud to Be Me." Miriam Blake, a principal at a school in the South Bronx with a large number of Hispanic students, created this project. Her objective was to help students develop a pride in their cultural heritage and a better understanding of others. Resources include sites for maps, information about each of the countries in Central and South America, recipes for traditional foods, and other references. Teams of four students each select a country, interview a native of that country, construct a project board to display facts about the geography and culture of the country, give oral presentations, make an audio tape of traditional music, prepare a food dish, and prepare a computer-generated flyer inviting parents and grandparents to attend a cultural day celebration at the school. The grading rubric gives clearly-defined descriptions of performance levels for each of the subtasks. The WebQuest addresses New York State learning standards for eighth grade in Social Studies and English Language Arts. The Social Studies Standard that is addressed is Standard 3: "Geography: Students will use a variety of intellectual tools to demonstrate their understanding of the geography of the interdependent world in which we live--local, national, and global—including the distribution of people, places, and environments over the earth's surface." The English Language Arts Standard that is addressed is Standard 1: "Language for Information and Understanding: Students will read, write, listen, and speak

"Teenage Drunk Driving" was created by Andrea O'Neill, a teacher of ninth grade at Santa Maria School. Her project, subtitled "The Road Not Less Traveled," presents a scenario in which students plan an intervention for a 16-year old friend, Bobby, who is planning to drink and drive. The task is to prepare a presentation for the annual Students Against Drunk Driving Day at the school which will persuade Bobby

not to drink and drive. Keeping a journal of all activities, students study ads, create a poster, conduct a survey, and create a music video, skit, or commercial to be used in the intervention. Resources include links to sites with general facts about drunk driving accidents, alcohol advertisements, state penalties, Teen ADD, National Highway Traffic Safety Administration statistics, and others. The grading rubric describes various levels of achievement in each of the components of the project. New York State standards addressed are in English Language Arts, Health Education, and The Arts. In English Language Arts, Standard 1 is: "Language for Information and Understanding: Students will read, write, listen, and speak for information and understanding." The WebQuest also addresses Standard 3: "Language for critical analysis and evaluation :Students will read, write, listen, and speak for critical analysis and evaluation." Standard 4 is: "Language for Social Interaction: Students will read, write, listen, and speak for social interaction." In Health Education, the activity addresses Standard 3: "Understand and be able to manage their personal and community resources: Students will understand the influence of culture, media, and technology in making decisions about personal and community health issues. They will know about and use valid health information, products, and services. Students will advocate for healthy families and communities." In the Arts, the WebQuest addresses Standard 1: "Creating, Performing and Participating in the Arts: Students will actively engage in the processes that constitute creation and performance in the arts (dance, music, theatre, and visual arts) and participate in various roles in the arts."

"Issues of Intolerance and Racism" was written by William Sherlog of Rice High School in Harlem. This WebQuest addresses New York State Social Studies Standard 5: "Civics, Citizenship, and Government: Students will use a variety of intellectual skills to demonstrate their understanding of the necessity for establishing governments; the governmental system of the United States and other nations; the United States Consitution; the basic civic values of American constitutional democracy; and the roles, rights, and responsibilities of citizenship, including avenues of participation." Its theme is "Too Much Meanness Messing the Millennium.". Students begin by examining the attitudes expressed by Tupac Shakur, Jay-Z, and Martin Luther King, Jr. They study and contrast these with reactions of people in six other occurrences involving prejudice or discrimination, referred to as "Mean Moments". Resources include the web pages of rap artists, speeches and writings of Dr. Martin Luther King, photographs and writings about the Molly Maguires, cartoons from Punch magazine, original sources about the Know-Nothings, an essay and other writings on Sacco and Vanzetti, readings on the case of Korematsu v. United States, the Port Chicago mutiny, and the Trail of Tears. The task involves individual reading and reaction, followed by group research on one of the "moments of meanness", construction of a graphic organizer, and preparation of a music video for the class. The grading rubric covers levels of performance for the essays, charts, lists, and video.

"Tomorrow's Investors: A WebQuest for Social Studies in Grades 10-12" was written by Albert J. Spiegel, a preservice teacher. In this eleven-week project, teams of three students play the role of industry analysts. They are required to monitor an industry and to choose a company in that industry. Learning activities include visiting the company's website, following the stock prices daily, seeking out news stories about the company, and following news reports about the economy. Students must prepare and deliver an oral presentation about the company and construct spreadsheets depicting the stock's performance. This WebQuest addresses New York State Standards for Education in Social Studies and English Language Arts. In Social Studies, it addresses Standard 4: "Economics: Students will use a variety of intellectual skills to demonstrate their understanding of how the United States and other societies develop economic systems and associated institutions to allocate scarce resources, how major decision-making units function in the United States and other national economies, and how an economy solves the scarcity problem through market and nonmarket mechanisms." It addresses English Language Arts Standard 1: "Language for Information and Understanding: Students will read, write, listen, and speak for information and understanding." It also addresses Standard 3: "Language for critical analysis and evaluation: Students will read, write, listen, and speak for critical analysis and evaluation." In Mathematics, Science and Technology, it addresses Standard 2: "Students will access, generate, process, and transfer information using appropriate technologies."

Conclusion

Standards-based education and assessments are receiving nationwide attention. Relating

technology to educational goals can be a daunting task for teachers. The WebQuest template is an effective means of addressing both learning standards and technology integration. The rich resources of the World Wide Web can be used for developing standards-based instruction across the curriculum. We have described how training in the development of WebQuests can enable teachers to develop instructional projects that address standards while making effective use of technology.

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Using WebQuests to Construct Learning

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Abstract: Developed in 1995 by Bernie Dodge and Tom March at San Diego State University, a WebQuest is an inquiry-oriented activity that requires students to use the Internet to find information and solve problems. This concept has gained the attention of a growing number of educators nationwide. This paper discusses what WebQuests are, the critical components necessary to develop one, how to locate examples and templates, and how they have been used in the author's classes at the graduate and undergraduate levels. Student perceptions are included.

Introduction

Many authors cite the need for, and the desirability of, integrating communication networks such as the Internet into the learning process (Bitter & Pierson 1999; Forcier, 1999; Jonassen, Peck, & Wilson, 1999; Ryder & Hughes, 1997). However, classroom teachers often complain that time spent on the Internet is risky business. Irresponsible use of the web is a genuine concern. Not only can learners waste precious instruction time surfing the web but also access to questionable information abounds. Additionally, anxiety, related to proficiency testing, limited access to and knowledge of computers, and restricted connect time, increase teacher resistance to integrating the Internet with curriculum. WebQuests counter these barriers by offering a structured format in which students participate in the retrieval of information to construct learning. This model actually saves instruction time by directing students to pertinent web sites, previously approved by the teacher, for information gathering. Since the content design of a WebQuest is only limited by the creativity of the teacher, skills required to meet curriculum standards can easily be addressed.

The Model

Developed in 1995 by Bernie Dodge and Tom March at San Diego State University, a WebQuest is an inquiry-oriented activity that requires students to use the Internet to find information and solve problems. This concept has gained the attention of a growing number of educators nationwide. Yoder (1999) suggests the flourishing use of this model of instruction is because WebQuests "are directly relevant to the curriculum and (they are) interesting and motivating to both teachers and students; they add spice to a lesson and direct a more responsible use of the Internet". Watson (1999) adds that WebQuests provide the practicality that is needed in the classroom for students to obtain information and use that information to form a basis to debate issues and form opinions.

Dodge (1998) explains that WebQuests may be either *short term* or *long term*. Short term WebQuests last approximately 1-3 class meetings with the instructional intent being knowledge acquisition and integration while long term WebQuests last from 1 week to a month, depending on the depth of information required. In long term WebQuests, the instructional goal is extending and refining knowledge. This requires the learner to analyze a large amount of information and convert it into a form (product) that others can respond.

Critical Components

Dodge (1999) suggests that in order to achieve efficiency and clarity of purpose, a WebQuest must contain six critical attributes. These attributes are introduction, task, process, resources, evaluation, and conclusion and are explained below.

1. The **introduction** presents the learner with some background information for the activity. It should motivate the learner to want to know more.
2. The **task** explains to the learner what is expected at the completion of the activity....what is the expected outcome.
3. The **process** is a detailed, step by step, description of the procedure needed to accomplish the task.
4. A collection of **resources** needed to accomplish the task are presented. The majority of these should be resources from the web even though other resources are acceptable.
5. Guidance to the learner can include tips on how to organize the information once it is gathered and how the activity will be evaluated. **Evaluation** rubrics are often a good source to guide the process.
6. A **conclusion** brings closure to the activity. This section may include a summary of what has been learned and/or some ideas for extending the activity.

Optional Components

Dodge (1999) explains that a WebQuest may contain several optional components. These elective attributes are explained below.

1. WebQuests may be designed for **collaborative groups**.
2. WebQuests may be in a **single discipline or multidisciplinary**.
3. **Motivational elements**, such as role playing or simulated situations, add effective results.
4. **Teacher resource pages** can provide other teachers with beneficial information such as suggested grade levels, class time allotment, pre-requisite knowledge required, proficiency outcomes/standards met by the WebQuests, etc.

Addition to Teacher Education Courses

This model was recently introduced to graduate students in the Master of Education in Classroom Technology program at Bowling Green State University as a part of the *Networks for Learning* course. This graduate program is more fully described in Brownell & Brownell, 1998 and Brownell, Haney & Sternberg, 1997. The *Networks for Learning* course involves an intense exploration of Internet services including the World Wide Web. The course, more fully described in O'Bannon & Brownell, 1999, is designed to enable teachers, through hands-on-projects, to use the services on the Internet to enhance teaching and learning. The culminating project in this class involved design and development of a WebQuest. After research of both online and print literature and class discussion, teachers designed a WebQuest appropriate for the student populations they are currently teaching. It should be noted that all students (22) had previously completed courses in multimedia/hypermedia design. Seven exemplary WebQuests developed in this class are available at http://www.bgsu.edu/colleges/edhd/edci/obannon/webquests.html. At the present time, teachers are in the implementation stage of these projects. Findings will be presented at the conference.

In addition to the model being part of the *Networks for Learning* course, the author introduced the concept to undergraduate Secondary Social Studies majors enrolled in a *Microcomputer in the Classroom* course. This course, the only computer course required of majors at this time, has staggering expectations. Due to time constraints, undergraduates did not design a WebQuest but rather researched both print and online literature and shared in online discussion of their findings. There were 3 overall themes found in these discussions.

Access to reliable web resources

Students agreed that students using the Internet safely is a major concern at the schools where they are currently in methods practice. However, they felt that WebQuests not only presented students with "safe" web sites but also saved valuable classroom time.

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One student wrote:

WebQuests are a fantastic way to enable students to work with and utilize the vast amount of resources on the Internet. There is so much out there, that looking for certain bits of information can be very challenging and frustrating. WebQuests seem to provide a bit of a solution to this problem.

Another agreed with this notion by saying:

How to incorporate the Internet into the classroom appropriately is a concern for everyone in education. WebQuests allow teachers to monitor what their students are getting into online. Sometimes Internet research can be daunting, and WebQuests take away the meaningless challenge of finding relevant information students can use for their projects.

Another student wrote:

It(WebQuest) helps guide them through the internet so they're not just searching aimlessly and getting confused because of it. Further, WebQuests also cut down on time that students would have to use on projects because sites are provided for them instead of having them search for informative and reliable sites themselves.

Increases higher order thinking

Students liked the idea that WebQuests offered opportunities to challenge students to think.

It is not often enough that we challenge our students with assignments that span the upper levels of Bloom's taxonomy. What a great tool for classroom use.

Other comments reinforced the combination of technology and higher order thinking:

Because students need to keep up with technology, this is a great way for it to be done where they have to think critically along with using their technological skills to do it.

Increases Motivation

Preservice teachers thought that WebQuests provided motivation factors for Social Studies students.

I feel that WebQuests would be useful to social studies teachers for a number of reasons. First, these projects require that students go beyond just fact finding. Students must deal with "real world" ideas and problems. Many times Social Studies comes off as being just people and dates. WebQuests can help deal with this problem. Secondly, WebQuests are relevant to social studies curriculum because they allow students to analyze a variety of sources and utilize critical thinking to come up with solutions to problems. This is partly what social studies is all about.

It(WebQuest) makes the Social Studies classroom more diverse and captivating to students who often need motivation. They offer students an escape from the same old routine, and in the process, motivate and encourage them to learn. It brings students out of their desks taking notes to a computer where they can experience education at a new level.

They also wrote that students' working with real life problems was a motivator.

I also like the fact that students are working to solve real life problems. This makes learning much more tangible and interesting for students. Overall, I feel that WebQuests are a great way to add to student learning.

Conclusions

Although access to the Web is relatively simple, integrating it into the curriculum to enhance teaching and learning is not. There are a number of valid concerns that teachers have regarding the use of the web. Among these concerns are accessing questionable information, wasted classroom time, and being able to meet expectations of proficiency tests. WebQuests provide a viable solution to these concerns. As with other methods of teaching, this too, requires planning. The planning can be quite time consuming however teachers are finding out that using WebQuests to construct learning is a good idea.

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The Web Institute for Teachers: Engaging Teachers in Developing Web-Based Curriculum

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Abstract: This paper describes the theory and practice of the Web Institute for Teachers, a professional development experience held at the University of Chicago during the past three summers and planned to be held in summer of 2000. The Institute is based on the principle that teachers should be at the center of curriculum development and that the best way to teach this process is to engage them in it. The authors, including the director of the Institute along with two teachers who were originally learners and are now "mentors" in the Institute, describe their experiences and indicate some ways in which the Institute can be improved.

Introduction

This paper describes the Web Institute for Teachers, a professional development experience for Chicago-area teachers conducted by the Graham School for General Studies at the University of Chicago. During 1999, 76 Chicago area teachers participated in the Institute. If we include the Institute's precursor, The World Wide Web for Teachers: Tools and Techniques, a summer seminar offered in 1997 and 1998, the Institute has trained more than 120 teachers, and will be revised and expanded for summer of 2000. (See http://cuip.uchicago.edu/wit for more information.)

The Web Institute for Teachers (also known as WIT) has as its primary purpose to develop the capacity of school teachers and librarians to incorporate the World Wide Web into their teaching. The audience of the Institute has included Chicago public school teachers, primarily, but also teachers from Chicagoland private and suburban schools. The design of the Institute is based on several principles:

1. Teachers should be involved in developing curriculum that is specifically designed for their students in their classrooms;
2. Teachers often need training in curriculum planning, design, and development (since most of them use pre-packaged curriculum or are responsible only for submitting lesson plans rather than curriculum);
3. It is fairly easy to develop web-based curriculum provided that teachers have experience with simple HTML editors; and
4. The best way to learn how to develop web-based curriculum is actually to develop it. In keeping with these principles, the Institute includes lessons in curriculum theory and development and web design.
5. Each participant develops a web-based curriculum module (usually as a member of a team) under the guidance of trained "mentors," who are school teachers who have already

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participated in the Web Institute or similar experiences. Mentor training is also hands-on, in that potential mentors develop web-based modules for teaching the concepts and skills to be taught during the Institute.

This paper includes detailed descriptions of the Web Institute curriculum and implementation, and also showcases several curriculum modules developed in the Institute. In addition, the paper offers some suggestions for others who seek to do professional development for teachers, based on our experiences participating in and teaching in the Institute.

History

For many years, the Graham School of General Studies (formerly the Office of Continuing Education) at the University of Chicago has offered a series of "Summer Seminars" for teachers. These seminars traditionally involved professors at the University introducing teachers to high-level academic material and activities related to various school subject areas. Among the more popular offerings have been "Shakespeare," "Foundations of Science," and "Calculus." In 1997, the Graham School, in cooperation with CUIP (The Chicago Public Schools/University of Chicago Internet Project) decided to offer a summer seminar for K-12 teachers on the use of the World Wide Web. Robin Burke, a Research Scientist at the Department of Computer Science at the University, was to teach the seminar. During the Spring of 1997, at a meeting of Computer Professionals for Social Responsibility, Burke gave a presentation on the work of CUIP. Attending that presentation was Craig Cunningham, then assistant professor at Northeastern Illinois University, who was interested in the curricular opportunities afforded by the Web. Burke and Cunningham talked after the presentation about the need to offer teachers not just technical training but also training in how to use the Web to enhance teaching and learning. It was decided eventually that Burke and Cunningham would co-teach the summer seminar, to be entitled World Wide Web for Teachers: Tools and Techniques. This four-week seminar (meeting for four hours a day) was offered free-of-charge to 22 selected applicants, with the financial support of the Chicago Public Schools and a grant from the Howard Hughes Medical Institution. . The seminar proved to be very popular and successful, and so it was offered again in 1998 to 20 teachers, along with a more advanced version of the course, called the Advanced Practicum in Web-based Instruction, which included 7 participants, 4 of whom had participated in the prior year's seminar. The Advanced Practicum became the basis for the 1999 Spring Mentor Training Seminar, described below.

In the Fall of 1998, Burke moved to Southern California, and planning commenced for a third offering of the summer seminar. Rather than repeat the format of the previous summers, it was decided to expand the seminar into an "institute," which would offer the possibility of multiple learning options, thus addressing the problem that participants in the seminars come in with a variety of skill and experience levels. An institute would also allow for many more participants, as many as 120 depending on funding, and would be taught by as many as twelve "mentor teachers" who would have previously completed training at a similar level. In order to ensure the success of the first Institute, a "Spring Training" component was added in which mentors would work together to design the lesson plans and "special topics workshops" for the Institute. (The Spring Training was designed utilizing the same "hands-on" engaged learning model utilized for the Institute itself.) Funding was secured from Hughes to pay mentors an "honorarium" for their participation in the training.

The decision was also made to charge tuition for the Institute. The Graham School figured the cost per participant at approximately $1000, and so tuition was set at that level. However, funding was secured, from Hughes, CPS, and other sources, to provide for tuition remission for some participants from CUIP.

Curriculum

Curriculum can be defined as "a plan for a sustained process of teaching and learning" (Pratt 1994, p. 5). The primary assumption of the Web Institute for Teachers is that teachers should spend considerable time and effort *planning* curriculum, whether or not learning is to utilize the World Wide Web. In keeping with this assumption, the director of the Web Institute has created a comprehensive "Curriculum Guide" that serves as a blueprint for the institutional structure and instructional practices of the Institute. (See Cunningham 1999). The structure and elements of the Curriculum Guide closely follow Pratt's suggestions.

Elements include: aim, rationale, goals, audience, prerequisites, subject-matter, detailed objectives, instructional plan, materials and facilities, and assessment and evaluation. The implementation of the Institute in 1999 closely followed this Guide.

The aim of the Web Institute for Teachers is to provide teachers with the training and experiences necessary for them to be able to design, create, and use web-enhanced curriculum modules with their students. By "curriculum module," we mean a plan for a set of related teaching and learning activities, together with the materials necessary to implement the plan. These differ from "lesson plans" in that multiple activities have been sequenced in order to foster growth. A module is similar to what has traditionally been called a "unit." (By "web-enhanced," we mean a curriculum that utilizes the World Wide Web for some of its resources, activities, or delivery.) A "complete" web-enhanced curriculum module includes both the curriculum plan and a set of web pages (called a "curriculum web") to support the teaching and learning envisioned by the plan.

In order to meet this aim, it is necessary for the Institute to focus on two diverse sets of subject-matter: curriculum development and web design. While participating teachers generally feel more comfortable with curriculum development topics, it is our experience that they need conceptual and procedural reinforcement. Therefore, we included activities which introduce certain key concepts (curriculum, objectives, assessment) and require participants to prepare a "guide" to their own curriculum modules that include the same elements as the WIT Curriculum Guide. For some teachers, this required that they work "backwards" from their usual lesson planning procedure. Rather than list learning objectives ("standards") *after* they developed their activities, teachers were asked to consider their broad and specific goals before they worked on their instructional plan and even before they began working on the web pages to support that plan.

The basic approach throughout the Institute was that the best way for teachers to learn curriculum development was to *engage* in it. We therefore tried to implement the eight indicators of engaged learning described in (Jones et al. 1994). However, we also wanted participants to think about what they were doing, and so offered reading materials and discussion topics that fostered reflection on the process of development and on how the participants could make their *own* curriculums engaging. We constantly asked the question: "How can this curriculum be made more engaging" and emphasized the special features of the Web that foster engagement, including its interactivity, hypertextuality, multimediality, searchability, and "open" system. (See Kahn 1997, p. 11 for a complete list of these features and how they affect learning.) Because the computer proficiency and experiences of WIT participants varied widely, the curriculum related to web design had to include very basic introductory materials but allow for an almost unlimited range of depth. This challenge was met, in part, by including very simple step-by-step lessons in simple web page design with Netscape Composer, and also by developing a set of self-paced "special topics workshops" relating to more advanced topics such as colors, frames, graphics, sound, JavaScript, and animation. Participants could access the workshops through the WIT web site, or they could sign up for sessions in which a mentor would guide them through the workshop or offer additional assistance.
The Institute also included a tool designed to encourage participants to explore advanced topics on their own. Rather than simply send them to search engines to seek random web resources, a database--called a "Web Tank"--was developed that contains more than 700 web resources, described in detail, searchable on a variety of fields, and expandable by participants or mentors. This database can be accessed at http://cuip.uchicago.edu/wit/99/curriculum/webtank/.

Instructional Plan

Professors Cunningham and Burke were the "instructors" for the World Wide Web for Teachers seminar in the summers of 1997 and 1998. While many participants benefited from their special expertise, some participants thought their instruction was too theoretical, aimed at too high a level, and less based on personal experience than it might have been. This led to the decision for 1999 to have practicing teachers provide the instruction in WIT. Those teachers who had participated in the 1997 and 1998 seminars provided an ideal pool of trained, experienced teachers for this role. To ensure that these mentors would both know the content and deliver it in engaging ways, a "Spring Mentor Training" program was developed. Mentors participated in the same hands-on program that participating teachers would. Each mentor took primary responsibility for development of one or more "Special Topics Workshops" that

would be offered during the Institute. These workshops incorporated the same structures and elements as the modules that would be designed during the Institute. (For a list of these workshops, and links to the curriculum webs, see http://cuip.uchicago.edu/wit/99/curriculum/specialtopics/index.htm.) Fifteen teachers participated in the Spring Training; of these, eight were selected to mentor in the Institute. (Of the remainder, four chose to "mentor" in a second Institute offered in collaboration with the Chicago Public Schools Department of Learning Technologies, one was chosen as Assistant Director of WIT, two decided to participate in the Institute as learners, and one was selected as Congressional Fellow.)

One hundred and eight people applied for WIT 1999. Of these, 80 were selected for participation. These participants were loosely grouped according to their prior experiences, and assigned to four "homerooms." Each homeroom had two mentors. Most of the time during the Institute was spent in homerooms; however, participants also came together as a large group for weekly plenary sessions led by the Director and including a variety of speakers, and for a weekly lunch. Several time slots during the four-week Institute were devoted to "Special Topics Workshops" during which participants could choose topics of interest to them. Wednesdays were designated "flex days," in which participants could choose to work on their modules at home or in the labs at the University on their own schedules.

The first week of the Institute was devoted to acculturating participants to this curriculum development approach, and to fostering the formation of teams who would work together on their modules. The ideal team size was thought to be three or four, but we allowed teachers to work in smaller or larger groups. Several Chicago-area museums offered to work with teams that wanted to base their modules on museum resources, and several teams chose this option. Teams began writing their curriculum plans, and searching the Web for suitable resources. During the first week, mentors also offered optional sessions on basic computer operations, for those participants who needed brushing up on system operations.

The second week of the Institute was primarily devoted to learning how to create web pages using Netscape Composer, and how to publish these pages to the CUIP server. Composer was chosen because it is widely available, is free, and easy to learn. (Some drawbacks of this choice include the inability to create frames or deal with scripting, and the focus on individual pages instead of web sites.) Teams put their curriculum plans on the Web, and began sketching out the structure of their curriculum webs.

The third and fourth weeks of the Institute were largely devoted to work time. Participants worked individually and in their teams to complete their modules. The Institute ended with two days of "demonstrations," in which teams showed others in their homerooms what they had done.

Sample Modules

WIT 1999 resulted in the development of 30 modules. A complete list can be found at http://cuip.uchicago.edu/wit/projectdatabase.htm. Some of these modules were incomplete at the conclusion of the Institute; some of the incomplete modules have since been completed on participants' own time. Several of the modules are "exemplary," in the sense that they incorporate all the elements of a complete curriculum, are well designed in terms of navigation and appearance, and include truly engaging activities for the learner. A sampling of modules across the range of quality include the following:

- Web Basics for Teachers (http://cuip.uchicago.edu/wit/99/teams/it5/it5index.htm) is designed to support teachers as they learn how to create their first web site. Activities and topics include an introduction to the Internet, searching, creating a simple web page, graphics and multimedia, and additional resources.
- The Portrait Gallery (http://cuip.uchicago.edu/wit/99/teams/portraits/frontpage.htm) introduces upper elementary students to the role of portraiture through history and leads them through the development of a "technological self-portrait.
- Bronzeville: Engine of Progress (http://cuip.uchicago.edu/wit/99/teams/bronzeville/welcome.htm) is a visually-appealing collection of activities and information about Bronzeville, the south side section of Chicago that was the center of African-American culture in the 1920s, 1930s, and 1940s, and is now experiencing a rebirth. (This module demonstrates, we think, the importance of developing curriculum that appeals to the interests of a particular group of students in their local situation.)
- Pizza Garden (http://cuip.uchicago.edu/wit/99/teams/pizza/) explores the relationships between plant biology and nutrition as they relate to eating pizza. It is aimed at the 3rd grade. Because this team

included a computer teacher with web development experience, it's look and feel is more professional than some of the other modules, and it also includes more resources.

• CulturEconomics (http://cuip.uchicago.edu/wit/99/teams/cultures/frontpage.html) is designed to introduce Conversational Spanish students to cultural and economic issues in the Spanish-speaking world.

• Isreality: A Journey Through Israel and Its Regions (http://cuip.uchicago.edu/wit/99/teams/israel/homepage.htm) is designed to introduce students in 4th through 9th grades to Israel through a virtual tour. It includes a wealth of pictures, graphics, and information about Israel, as well as some online games. Developed by teachers who teach in Jewish day schools in the Chicago area, the module was motivated by the fact that many American Jewish students have little or no familiarity with Israel as a country.

Improvements for 2000

As we prepare for WIT 2000 for next summer, we are tinkering with the curriculum and structure in order to serve our participants better. We are concentrating our efforts in two areas: formative and summative assessment and the problem of participants' wide range of skills coming into the Institute.

In order to help the participants produce better projects--projects that rely on sound curriculum planning and use the principles of good web design--two of the WIT mentors have developed a WIT Web Curriculum Project Assessment for use in WIT 2000. The assessment includes both a rubric and questions for reflection. The rubric addresses specific topics related to web authoring skills: page presentation components (these include technical elements, navigability, design, mechanics, and credibility), WIT curriculum guide components, and a group component. The questions will give teachers an opportunity to reflect on the differences between their web curriculum and more traditional non web based curriculum.

The WIT Curriculum Web Assessment will be an on-going tool for teachers to use throughout the Institute. It will be distributed to and discussed with the participants prior to its use and will become part of the learning experience. Teachers will be asked to evaluate their own work, the work of their curriculum team, and that of their peers. In addition, mentors will also evaluate the web projects. The assessment scores will likely change as teachers' expertise with curriculum web authoring skills increases.

It is expected that the WIT Curriculum Web Assessment will assist mentors as they make instructional decisions concerning both individual participants and their homerooms. The assessment scores will alert both mentors and participants to the skills that must be taught for the successful completion of the curriculum web projects. Participants in the Institute may use the assessment to guide their choice of special topic workshops - it will be apparent which skills need more attention as teachers work through the assessment. Likewise, the focus of the special topics workshops may also be driven by the assessment results. (The draft WIT Curriculum Web Assessment is available at http://cuip.uchicago.edu/wit/99/beta/rubric2.htm.)

As we mentioned above, there is a great range of computer capabilities among teachers who participate in the Institute. To address the needs of those teachers who are computer neophytes, there will be a week long Pre-WIT training offered in 2000 that will teach basic computer skills. Some participants will be accepted to the Institute on the condition that they participate in this Pre-WIT. During this week, mini lessons on topics such as file management and saving documents will be offered. As a result, it is expected that teachers will be able to devote more of their energies during WIT to learning Composer and writing their web curriculum and spend less time "catching up" on basic computer skills.

Suggestions for Others

Based on our experiences during the past three summers, we have some suggestions for others who wish to conduct professional development to help teachers produce web-based curriculum.
First, to foster the kind of engagement that produces ownership and quality, it is imperative that participants have a reason for which they are developing their web-based curriculum. Participants should learn by developing curriculum webs that will serve their specific students, rather than engaging in a purely academic exercise.

Second, selection of competent mentors is extremely important. Mentors must also be calm, confident, and comforting in order to help their fellow colleagues achieve success. Possession of these qualities guides mentors to know when to push, stand back and produce more concrete exemplars to help participants get to the next level. Mentors who've have experienced the same trials and tribulations themselves keeps participants confident.

Third, having mentors working in pairs makes quite a difference. As a team, one mentor can present while the other assists their participants. Having someone right there helps the comfort level of those feeling unsure. Mentors also see different signs of both stress and success. Since adults find this experience stressful, having two personalities there is often helpful when trying to calm or push a participant forward. Modification is easier when two mentors see the same needs of their students.

Fourth, since groups will vary in their abilities and needs, mentors should have final control over instruction and should even modify the Institute curriculum where necessary. Mentors must guide, circulate, encourage, redirect, clarify, validate, facilitate, question, observe, model, motivate, watch and trouble-shoot. Mentors develop their own instructional web pages, giving them the capacity to modify them as needed. The following page shows how Ellen and Frada modified a page as needed.: http://cuip.uchicago.edu/wit/99/beta/july13.html.

Fifth, participants must have enough time to feel comfortable with both the equipment they are using and the necessary software. Learning about curriculum, software, hardware and page design will otherwise become too overwhelming. There is more data to process than ever before. We think four weeks is a good compromise between trying to fit too much into the Institute and taking up too much of the summer.

Sixth, it is important to stress careful and reflective curriculum planning. Because teachers--especially veteran teachers--think they know all about curriculum development, they may want to jump right in and start developing web pages. This is a mistake, because there is a tendency to keep a given web structure even if it later proves cumbersome or distracting to the learning that is intended. Spending a few days developing a good set of specific learning objectives and planning activities that build toward these objective will pay off in the long run.

Seventh, participants need to know that they are never alone. A participant listserve provides an adequate avenue once the class ends. Some participants wanted to form a users group so they could continue to share their successes and failures. Others were content on just talking to their team or fellow colleagues at their school.

Finally, we're very interested in hearing from others who are conducting similar professional development experiences. Please email us.

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A Virtual Learning Environment for the Improvement of Cognitive Processes

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Abstract: the project is aiming at building a virtual learning environment based on Internet. It consists of an online course for improvement of cognitive processes. The program involves theoretical and methodological basis for the study of cognitive processes. The project framework is basically the Triarchic Theory of Human Intelligence of R. J. Sternberg. Potential participants are University graduates and University teachers coming from different sciences. As an interactive way of teaching and learning both designers and users are considered critical agents to develop the virtual learning model. The main features of the project are: using Internet for designing, implementing and monitoring materials, acquaintance with non traditional means of learning such as on line lectures, searching and reading by WWW, assignments and testing through electronic ways, producing a software. The availability of a virtual learning environment in Spanish and the model design according to some local peculiarities may be considered an innovation.

Introduction

This paper presents an advancing report of the project *"Building Virtual Environment for the Development of Cognitive Processes"* (1999-2001).[1]
The project combines contributions from Computer Science -online courses and multimedia applications- and Cognitive Psychology - problem solving and applying cognitive strategies in varied situations and virtual contexts.
Objectives and activities included in the project can be summarized as follows:

- Building a virtual learning environment for the displaying of cognitive processes (objective)
- Training University graduates in an online program (objective)
- Developing a model for the designing of the virtual environment.
- Instructional design
- Initial validation
- Programming the prototype (HTML; selection a courseware)
- Piloting the prototype with the population target via Internet (N=10)
- Content validity
- Final version of the prototype

[1] The Project is financed by the National Scientific and Technical Research Council (CONICET)

Background

The spreading out of the cognitive processes is considered a priority and a requirement both for University teachers and students. As a privileged source of producing knowledge, the University claims fostering and putting into practice high mental abilities.
Cognitive Psychology provides conceptual frames, procedures and instruments for the development and improvement of human cognition. Among them, the Triarchic Theory of R. J. Sternberg (1986, 1988) offers a theoretical basis, a methodology and a program which have received wide recognition .
The Triarchic Theory identifies three kinds of intelligence: analytical, creative and practical. As the author states (Sternberg, 1986) metacomponents are the crucial elements of analytical intelligence and also in the whole theory. Creative intelligence is mainly related to solving new problems and claims knowledge and cognitive abilities.
Taking into account a statement made by Sternberg, the project is based on the idea that nobody may help people to know the cognitive processes in other people if previously has not tested oneself.
During the last five years the authors have introduced selected parts of the Triarchic Theory into training courses for University teachers coming from academic units of the National University of La Plata, Argentina (Malbrán, M. 1996; 1998). The courses presenting the theory, focusing on the metacomponents and solving problems and designing of projects to apply the theory to different content areas. It also included an exploratory study of implicit theories of intelligence following Sternberg´s procedures.
The courses adopted the usual face to face system. Notwithstanding, in the course of 1999, the e-mail was introduced for tutoring and enrichment. This experience showed the potential value of the e-mail for learning and teaching: participants made efforts to access and to become familiar with the e-mail, it allowed a better time distribution for course activities and it enhanced in the participants interest for using the e-mail as a teaching device in University contexts.
Following this line, a further step is designing an online program.

Design

The question of validity

Some questions about the model design are related to the control of ecological and content validity. Face validity is also important.

Ecological validity considers the presentation of the program, the selected tasks and the way of interaction. One advantage of this program lies in the use of Spanish. Few people in our Argentina master English as to follow instructions, pose problems or chat in this language. Besides, due to idiosyncratic beliefs, tasks must sound local that is not taken literally from another cultural context. We are trying to select illustrations coming from different areas, away from the classical problems in the field such as the "Duncker Tumor Case" or the "Hanoi Tower". As a result of the experience collected from postgraduate courses a set of materials is available.
An aspect related to the program presentation lies in the icon selection. The symbols should clearly identify the program. A potential sources are popular characters coming from the humor literature, local advertising and popular sayings. Another possibility is to use abstract signs.

Content validity refers to the selection of the relevant aspects of the Triachic Theory according to the aims of the program. The program focuses on the metacomponents and solving problems. Some experience about applications of the metacomponents in activities such as to write a scientific paper, an essay, a test or during tutorial tasks have collected by the authors.

Face validity. The program does not pursue to "teach" cognitive processes, but to foster and improve the existing ones. In this sense, this is not a learning device itself. Materials must take into account this characteristic.

Initial validation control consists of the consultation of experts on Computer Science and Cognitive Psychology.
Piloting the program with graduates students and University teachers is planned.

The question of strategies

Evidence collected in the courses and objective tests shows the limited knowledge University teachers and graduates have about the use of INTERNET. According to this the initial part of the program is aimed to the development of strategies to use INTERNET applying some aspects of the Triarchic Theory.

Favoring familiarity with INTERNET and the displaying metacomponents and solving problems includes the following strategies.

1. *Searching*
   Becoming aware of what is the aim or how to formulate the task.
   Searching strategies may involve subdividing the task into subtasks, that is, considering alternatives for searching such as e-mail, author's name, key words, institutions, nets, etc.

2. *Source localization*
   Monitoring the performance. Demands identification of relevant sources connected to or sending to other sources (alternatives, complementary, enriching; new), detecting mistakes, reorienting the search, etc.
   Monitoring also involves considering other sources that may lead to change the searching, to reformulate the task, to modify the objectives, to follow a different sequence or path.

3. *Evaluation*
   Assessing the results of the entire task, the extent up to which the desired information was obtained and planning future action.

4. *Solving new problems*
   An initially less familiar task (netsurfing in INTERNET) is progressively changing into a more automatized one. Some elements or subtasks are more liable to automatization than others.

Feedback between searching, monitoring and evaluating the performance resembles the model of Sternberg (see Figure 1)

Figure 1: Strategies

The instructional design of the program includes:

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- Organizing the content sequence
- Giving prompts
- Making corrections
- Fostering self-action (for instance, identifying mistakes)
- Promoting search
- Evaluating the mastery of INTERNET
- Choosing relevant activities
- Helping the monitoring
- Collecting formative information

A draft of the program will be presented in the sessions.

Gradually the novelty gains adherents and is seen as culturally valid.
The ordinary question "How do you know it ? or "How do you find it out? began to be answered "I found it out in the INTERNET", "I looked for it in the INTERNET"

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Comprehensive Examinations Via E-Mail

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Abstract: This paper will examine the electronic administration of the written comprehensive examination for the Masters Degree in School Library Media Services from James Madison University. Prior to the fall semester, 1998, all students traveled to the main campus in Harrisonburg, Virginia to take the three hour exam. Beginning in November, 1998, four students were sent the exam via e-mail and returned their responses via the same method. The following paper will include a comparison of the two methods of administration, the results of a seven-item questionnaire and a review of the James Madison University Honor System.

Introduction

James Madison University's College of Education and Psychology has offered a library science program, leading to teaching licensure by the Commonwealth of Virginia's State Department of Education since 1926. This entry-level program was based on an undergraduate degree with 24 hours in library science. In 1975 a Master's degree program in education was initiated with a major in school library media services. In 1989 a restructuring of the teacher education programs throughout the state was undertaken. As a result, the undergraduate library science program was discontinued and the restructured program moved fully to the graduate level.

A significant number of students enrolled in our program have been residents of Northern Virginia. Most live and work in Fairfax, Loudoun and Prince William Counties. Since the travel time required to reach the JMU campus in Harrisonburg is approximately 2 to 2 ½ hours, a remote site in Manassas Virginia was established in 1992. Courses were offered in the evenings and on weekends at this site. Most students would take the majority of their courses at this site with only 6 to 9 hours taken during the summer in Harrisonburg.

Since 1989, all students seeking licensure in school library media services have taken a comprehensive examination during their final semester prior to graduation. Prior to the fall of 1998, all students took the comprehensive examination on the JMU campus on a Saturday morning between the hours of 9:00AM and 12:00 noon. Students could choose the word processing program with which they were most familiar. Clarisworks, Word Perfect and Microsoft Word were the three programs from which they could choose. The decision to administer the test on computer versus paper and pencil has been supported by a significant amount of later research (Hinken, 1993). In the fall of 1998, in response to student requests, the faculty of the library science program decided to administer the comprehensive exam via e-mail.

The Study

Six students took the comprehensive exam during the fall of 1998 between November 12th and 18th. Two students took the exam on campus in the traditional manner and four took the exam via e-mail. Results of the exams were compared and there were no differences between the two groups. Since that time the examination has been exclusively administered electronically and there continues to be no difference between the two administration methods.

The exam given in the fall of 1998 consisted of the following three essay questions:

1. Increasingly, telecommunications based networks (such as Internet, Dialog, VAPEN, etc.) are being used by teachers as well as students. First, discuss the reasons why schools should allocate resources to support this type of endeavor. Second, describe some of the issues/concerns that arise when using telecommunications-based networks. Third, discuss how the use of this type of resource impacts the

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school library media specialists' roles as teacher, curriculum development consultant and instructional technology specialist.

2. A parent has asked that books or other media be removed from the library media collection. Discuss your plan for handling challenges to materials, both before and after a complaint is received. Be specific in discussing the content of relevant policies and procedures you would use.

3. Information Power, guidelines from AASL/AECT, outline a new role for the library media program in the school. Writers such as Eisenberg and Turner have also provided new models for the role of the school library media specialist. Discuss your philosophy of the role of the school library media specialist and compare/contrast it with that developed in Information Power and by authors such as Eisenberg, Turner, Leortscher or others.

All students received passing grades for the exam, receiving numerical scores between 93 and 98. Since that time all students taking the comprehensive exam have achieved similar scores with no failures. Both administration strategies resulted in comparable scores. The decision to use the essay format was based on the desire to measure writing ability as well as factual knowledge of the field of library science despite previous studies which indicated that standardized tests may also be used as comprehensive examinations (Gothberg and Aleamoni, 1988).

During the fall of 1999 a questionnaire was sent to the twenty-six students who had taken their comprehensive exam via e-mail. The following seven questions were sent to them, also via e-mail:

1. Comparing the "old" way of taking comps on the JMU campus with the "new" method of taking them via e-mail, which do you feel would be LESS stressful.

2. If you had had a choice, which method would you have chosen?

3. What was the primary POSITIVE element in taking the exam in your home?

4. What was the primary NEGATIVE element in taking the exam in your home?

5. Did you religiously adhere to the three-hour time limit? (Please explain if the answer is no -- for example, some may have taken a break between questions and come back to complete the remaining one(s) – not taking over three hours to complete the entire test)

6. Would you recommend that this testing method be continued for students taking comprehensive exams in other fields of study as well as SLMS?

7. Are there any refinements you would recommend if your answer to #6 was yes?

Findings

Twenty-two students responded to the survey, four having either moved or changed their e-mail address since taking the examination. All stated that they preferred the e-mail administration strategy over the on-campus method.

Many stated that they were aware of the previous groups of students who had driven to campus, many on Friday evening and spent the night at a motel, prior to the Saturday morning examination. They indicated that they were grateful for the opportunity to save both time and financial resources. Twenty students reported a lower level of stress due to the fact that they could determine the time and location for their examination. Every student indicated that they would recommend this administration strategy for future comprehensive examinations.

The primary negative reaction concerned the technology itself. Sixteen students indicated a concern that their responses would be "lost" and that there was no way of knowing that their e-mail replies were received at the university. I should state that all students' replies were noted with a further reply indicating that the answers had been received in good order. Finally, questions regarding the honesty of the students during the examination were raised. Upon matriculation all students become part of the JMU honor system, both at the undergraduate and graduate level.

The following four honor code violations are related to the administration of tests. There are thirteen additional specific violations cited which include other acts of academic dishonesty.

The James Madison Universtiy Honor Code

Students shall observe complete honesty in all academic matters. Violations of the Honor Code include, but are not limited to, taking or attempting to take any of the following actions:

1. Using unauthorized materials or receiving unauthorized assistance during an examination or in connection with any work done for academic credit. Unauthorized materials may include, but are not limited to, notes, textbooks, previous examinations, exhibits, experiments, papers or other supplementary items.

2. Copying information from another student during an examination.

3. Rendering unauthorized assistance to another student by knowingly permitting him or her to see or copy all or a portion of an examination or any work to be submitted for academic credit.

4. Obtaining prior knowledge of examination materials (including by using copies of previously given examinations obtained from files maintained by various groups and organizations) in an unauthorized manner.

Questionnaire item #5 addressed this concern. All twenty-two students indicated that they had strictly adhered to the honor code and took no more than three hours to complete the exam and that they used no outside materials for assistance. Several did indicate that the temptation to use notes was a concern but that they did not violate the code in any way.

In conclusion, we feel that the administration of comprehensive examinations is a viable testing method which should be considered in other programs. The savings in terms of time, stress and money are considerable. The element of trust was also appreciated among the group of students used in this study.

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The Technical Helpdesk for CalStateTEACH: The "ER" for a Distributed Learning Teacher Credential Program

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Abstract: This paper will discuss, primarily from the perspective of the helpdesk provider institution, issues involved in establishing, managing, and operating a high quality, user-friendly, technical support center to meet the varied needs of a widely dispersed student population working towards obtaining their teaching credentials. Since the "helpdesk" model is not well understood by many who are not directly involved, a hospital emergency room is periodically used as an analogy, with regard to many of the challenges and issues involved. It is hoped that, in addition to being of general interest, this paper may be of help to others concerned with establishing technical support services in distance learning environments.

Overview of the CalStateTEACH Project

On April 28, 1999, California Governor Gray Davis and CSU Chancellor Charles Reed unveiled the CalStateTEACH Program. The Governor said, "There has never been a point in our history where we needed teachers more. The CalStateTEACH program is the first and most important step to honoring my commitment to making sure that every teacher in every classroom in California is fully credentialed and every student has the benefit of the best teacher possible."

The CSU publication, *STATELINE*, described the program as follows: "CalStateTEACH offers a new approach to earning a California teaching credential by addressing the problems of working teachers with scheduling difficulties, family commitments and limited time. Accepting applications for September 1999, CalStateTEACH is a visionary program that puts a credential in reach of the 15,000 California elementary teachers now working with emergency permits by combining print material, tapes (audio and video), email and the Internet and periodic Saturday seminars with visits to elementary schools from CSU faculty."

The article continues, " Modeled after the successful British Open University, the CalStateTEACH curriculum was designed by a team of 30 CSU faculty members from virtually all CSU campuses to prepare working teachers to meet California classroom standards. Offered in four stages over an 18-month period, beginning teachers will be supervised by a CSU faculty member who will be available for advice and support, visiting their classrooms to observe them in action. Partnering with school districts throughout California, a veteran teacher from the credential candidate's own district will also serve as a mentor.

"CalStateTEACH recognizes that a working teacher has little time to commute to his or her closest CSU campus. Unlike traditional campus-based courses, CalStateTEACH will be centered at its five

regional centers throughout the state. CalStateTEACH supports independent learning, where students can study at their own place and time, without the need for class attendance. Using email and the Internet students can receive and submit assignments, question professors and discuss the program in special chat rooms. Although the delivery technique is innovative, the rigorous nature of the credentialing process is not. Assignments, due dates, and testing are all elements of CalStateTEACH. Applicants are expected to commit at least 12 hours per week to complete the program successfully. The CalStateTEACH program is the equivalent of 39 semester units. Participants who complete the program will receive a Multiple Subject teaching credential (elementary) with an emphasis in Cross-cultural, Language, and Academic Development (CLAD), as well as immersion in a technology-rich learning environment. The key to the CalStateTEACH program, says Chancellor Charles B. Reed, is that it combines independent study at home via the Internet with personalized supervision by school-based mentors and visiting specialists from Cal State campuses."

The CalStateTEACH Technical Helpdesk

Selection of CSU San Marcos as the Statewide CalStateTEACH Helpdesk

All participants in the CalStateTEACH program must have access to a computer and the Internet, and are expected to make frequent use of the course website (based on a customized version of the WebCT course management system) and other computer-based instructional materials. They are expected to use email to communicate with other students and with a CSU faculty member who serves as a mentor for each group of 18-20 students. With the on-line aspects of the program being very significant, and students with different levels of computer experience scattered geographically all over the state, using a wide variety of computers and Internet service providers, it was critical to have a single helpdesk to serve as a source of help and support when needed.

A request for proposals was sent out to CSU campuses and other possible providers of helpdesk services. California State University, San Marcos was selected on the basis of its experience and reputation, to provide this "Emergency Room" service to the several hundred participants in the CalStateTEACH program. As a university committed to innovation and excellence in technology, San Marcos had for several years placed a very high priority on providing campus computer users with a very nurturing and supportive "high-tech, high-touch" environment. In addition to having the highest level of technical competence, both professional and student assistant helpdesk staff prided themselves on developing positive interpersonal relationships with the faculty, students, and staff who they served. Indeed, it is not unusual for users to bring cookies, brownies, and candy to the helpdesk. When asked what were the factors that led the CalStateTEACH program to select CSUSM for helpdesk services, one evaluator commented that this "calorie metric" was certainly an indicator of the high esteem in which its customers hold the helpdesk support staff!

CSUSM saw the opportunity to meet an important statewide need by serving new clients with very high quality support as a "win-win", since we could also increase the hours of service to our local campus constituencies. We could do this using existing staff and facilities, with funding from the CalStateTEACH used to add a new staff position, increase student assistant hours, and make investments in our internal telecommunications resources.

Restructuring the CSUSM Helpdesk to Serve our New Customers.

While the CSUSM Helpdesk had worked diligently over the years to continue to improve customer service, this had been entirely in the context of serving local faculty, staff, and students. In this environment it had been possible to solve customers' problems in a variety of ways; by telephone, email, walk-in service, visiting the client's office, or even, on occasion, by making "house calls", when someone had a particularly challenging problem in remote use of their home computer. Clearly these options would not all be available with the geographically dispersed population we would be servicing in the CalStateTEACH environment, so we needed to find ways that we could provide excellent service to remote users.

Although program participants would be provided with a "Technology Quick Start Guide" and some technology orientations at workshops to be given at the regional centers, it was expected they would

look to the Helpdesk for the majority of technical help needs as they worked on assignments, and they would need this in a timely, responsive, and "user-friendly" way. Consequently a major emphasis was placed on providing as long hours of coverage as was feasible (Monday-Thursday 8am -10pm, Friday 8am - 7pm, Saturday 9am - 5pm, and Sunday 1 pm – 9pm). While not quite the 24 hours/ 365 days availability of a hospital emergency room, these hours seemed likely to meet the needs of most students most of the time.

CalStateTEACH students would be utilizing a great variety of computer hardware and software, and would be receiving Internet services from a host of different providers so rigorous training was provided for all professional and student assistant helpdesk staff who would be answering calls at any time. Helpdesk staff was provided with the same materials students would receive so that they could become familiar with them, and anticipate the kind of calls to be expected. CSUSM experts on particular topics, for example WebCT, presented workshops to helpdesk staff. In general, as with the medical ER environment, having a superbly trained staff, "ready for anything", was the goal.

Another priority was to put in place a sophisticated communications infrastructure that ensured that if the person receiving the call was unable to solve the student's problem, they could escalate it to an appropriate expert. When to escalate a trouble call is a complex issue, depending on the workload at a particular time, the expertise available on the spot, and how critical the problem involved. Again, like the hospital emergency room, the helpdesk has to be very responsive and flexible, and must sometimes make difficult "triage" decisions among competing demands on time and expertise.

A very important, and often overlooked, aspect of providing helpdesk support is being supportive and empathetic with the client at the other end of the phone. Students are calling the helpdesk because they are suffering from some problem, and just like patients in a medical situation they need to be treated with compassion and caring. The CSUSM Helpdesk staff has a reputation for good "bedside manner" with local users, and is making every effort to treat their new CalStateTEACH clients in a similar fashion.

Metrics: Information Contributing to Continuous Improvement.

The CSUSM/CalStateTEACH Helpdesk keeps track of all calls by means of a proprietary software package, *Remedy Action Request System*, which, in addition to facilitating day-to-day management of the operation, provides a wealth of data that can provide valuable information to inform tactical and strategic decision-making about resource allocation to improve service effectiveness and efficiency. As staff members receive calls, work on them, and pass them on to others if needed, all relevant information is recorded in the *Remedy* system. It is possible to review logs and identify frequent problems (this may suggest, for example, a communication to all students who have not yet encountered this problem), sources of calls (it might be that some problems are regional and this information could be helpful to local CalStateTEACH staff), or if a problem relates to specific hardware or software (informing decisions about continued use).

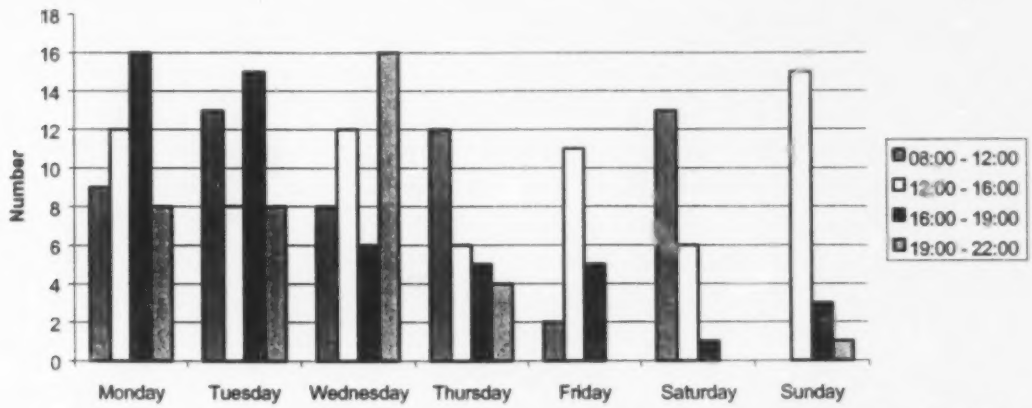

Figure 1: CalStateTEACH Helpdesk calls by time blocks and day of week, for month of September 1999

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An almost infinite variety of metric reports can be generated from the *Remedy*, or other helpdesk system database. Figure 1 shows one example used to review times of greatest use of helpdesk services in a particular month (September 1999). While it is too early in the program to generalize, this data might suggest that keeping the operation open on Sunday evenings is not cost-effective.

Issues and Challenges

Given the very short timeline under which the CalStateTEACH Helpdesk program was implemented, it has to be considered a very successful venture. Hundreds of calls have been received and responded to with strong praise from students, faculty, and CST management. The focus has always been on meeting the needs of students first, and in order to accomplish this a very collaborative organizational culture has evolved, with the recognition that all involved in delivering CalStateTEACH instructional and support services have to be continuously innovative and flexible.

New challenges come along almost daily, and several issues are still not completely resolved. One example is that CSUSM technical staff has made themselves available, via cell phone and pager, beyond regular working hours to provide information to helpdesk staff when calls have been beyond their scope, and we have still to work out appropriate compensation strategies to deal with this on a regular basis. A second one would be that, while policies and procedures are under development, we are still operating for the most part in an ad-hoc way; as the program evolves and we accumulate more data, we expect to be able to develop more systematic approaches to dealing with situations that may occur frequently. Thirdly, while we have enjoyed good communications among the numerous entities involved in this very complex and innovative distance learning initiative, we need to even further improve both intra-group and inter-group communication. Another major challenge is developing and implementing an automated system whereby students will be able to find answers to frequently asked questions (FAQs) 24 hours a day, 7 days a week. This is well along but has yet to be installed.

But perhaps the greatest challenge is recognizing that when we are involved in such a dynamic effort as using sophisticated technologies to deliver education and support learning at a distance, we will probably be in a state of "continuous chaos", no matter how well we plan. Working and managing in such an environment calls for people who are flexible and agile, who thrive on change, and who have a high tolerance for ambiguity. Fortunately, this project has demonstrated that the CalStateTEACH project has attracted just such champions.

Lessons Learned, and Some Possible Future Directions

Although it is very early to start making predictions for a program that has barely started, it may be that already we are learning some lessons that will contribute planning for future years of this innovative instructional program, and for others considering how to provide better support for distance learners.

First, based on the kinds of questions received by the helpdesk, it seems that, from the student's perspective, there is not a clear line between "technical support" questions, and seeking other help vital to their success in learning. While we can "pass off" non-technical questions to others (e.g. faculty, administrators), there may be added value to the learner and economies of scale to the program, in considering the scope of the helpdesk in broader terms than previously envisioned.

Second, there is an enormous amount of data collected in the operation and management of the helpdesk function. While this is primarily to streamline operations, provide performance metrics, and inform tactical decisions concerning the helpdesk function itself, there are ways that this data could provide useful information to the broader instructional program. Particularly if the scope of questions handled by the helpdesk is expanded, analysis of data may lead to information that could lead to continuous improvements in curriculum, instructional delivery, and student support services.

Lastly, we are already finding in the CalStateTEACH program that helpdesk staff has much more to contribute to the project than answering students' questions. Because they are on the "front line" with students for over 80 hours a week, they gather considerable insight into what is working well, and not so well, and they are being consulted more and more by both administrators and faculty seeking advice on making changes and improvements. As this program evolves, and as other similar programs with a major

distance learning component are created, early and ongoing involvement of the helpdesk provider may contribute significantly to quality and effectiveness of all aspects of remote teaching-learning programs.

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Talent Detection and Development Using the Internet.

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Abstract

In this paper will be applied a survey to identify the uses of the Internet and the detection of the talents and learning style preferences of the users. Based on these characteristics detected will be developed a software capable of training thinking skills and information strategies required and implied in talent development program. It will be applied three instruments, one is the *Survey of the Internet Uses and Abuses*, (Lewis and Ingham 1998) and the *Tel- Aviv Activities and Activities and Accomplishments* (Milgram 1994) *Productivity Environmental Preference Survey Inventory* (Dunn, Dunn, Price, 1993) In a web sever will be developed a program where any user will have access and it will have controlled the users´ performace and will give him feedback on his talent strengths and learning style preferences. In the web server will be installed other software programs to detect and develop different kinds of talents.

Purpose of this research

The principal objective of this research is the detection of the Internet users' talents and the development of software that will help them to train their thinking, decision making and information processing skills.

A comparison will be done between the Mexican sample and all the other samples that will have access to the Web Site. This will determine the talent domains and learning style preferences and uses of the Internet of the different samples.

In the first phase the learning style preferences and the area of creative domain will be determined. The subjects will receive feedback on their strengths and weakness to learn and the potential areas of creative talent.

A group of professors involved in improving their teaching will designed special units to help their students to improve their learning, based on the learning styles preferences.

The learning outcome assessment in each subject will help professors in the evaluation of the impact of their redesigned courses.

In the second phase, the professors will work together with a group of cybernetic engineers to design a matrix of the WEB tools (chat, e-mail, Newsgroups).

In the third phase, the materials developed the WEB tools will be applied and evaluated by the professors and engineers. The evaluation criteria will be the impact on the learning outcomes under the two scenarios: the WEB tools and the one without them.

Subjects

A sample of Mexican subjects that will access to the web site and a representative sample of Mexican undergraduates from La Salle University, Mexico City Campus. (N=500).

Subjects will access to the web site and will answer the questionnaires and surveys. The surveys and questionnaires have been adapted to the Mexican population. The Survey of the Internet Uses and Abuses. Consists of 38 questions divided into three groupings: a) Background data including age, sex, high school attended, major, amount of experience with the Internet as a whole, E-mail, The World Wide Web (WWW), Chat, Games and downloading software. Time units will be converted from a range variable to an ordinal number system and c) Academic self-reporting of semester grade point average. Self-report date will be verified internally. Data will be analyzed using regression analysis procedures.

Procedures

The sampled subjects will be administered by Internet with three different surveys and will be assessed in their talent strengths and learning styles preferences. Based on the detection of these preferences and talents, software will be developed to train thinking, decision making and information processing skills.

The program will develop use Java and HTML language, this URL will be up and you will find using the principals web searches, as yahoo, altavista, etc.

Results

Results for Learning Style

The Learning style preferences of the Mexican Talented and in comparison with other samples, differences and similarities.

Results for Creative Performance

The measures of creative performance of the Mexican Talented in the samples will be compared using discriminant analysis procedures (*stepwise).*

Results for Creative Performance and Learning Style

The measurement of creative performance of the Mexican Talented will be compared with the results in other samples by their learning style preferences and the measurement of the software capabilities.

It is expected that the talented users of the samples will prefer to learn by specific perceptual preferences.

It is probable to find different learning preferences and talents in the samples. The possibilities of using these learning preferences in the software that will train thinking, decision making and information processing skills.

Results for Online Activities

The World Wide Web, Chat, game playing and downloading activities will be analyzed as variables and its correlation.

Internet Influence on Academics
The analysis of the correlation between the variables and the accumulative and semester grade point average will be found.

Time spent on the Internet
Subjects will be asked about time they loose on the Internet when they should be doing other things. The results will be reported and analyzed to find out interference between the use of the internet and the academic performance.

Learning outcome using WEB tools
At least to environments will be evaluated, one without WEB tools implied, and the second with the WEB tools. The comparison will demonstrate the impact of the WEB tools in the learning outcome.

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